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Streamlined Biodiversity Development Assessment Report

Residential Subdivision

20 & 20A Cantwell Road and 60 New England Highway, Lochinvar, NSW



**Prepared for: Trustee of the Roman Catholic Church for the
Diocese of Maitland Newcastle**

C/- Monteath & Powys

BOAMS Ref: 00048510/BAAS19076/24/00048647

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Revision: 03

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Document Control

Document Name	Streamlined Biodiversity Development Assessment Report for Staged Subdivision at 60 New England Highway and 20 & 20A Cantwell Road, Lochinvar, NSW. (Lots 2 DP1214402 and Lots 1 & 2 DP1299958).
Project Number	4951
Client Name	Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle C/- Monteath & Powys

Client Distribution

Revision	Date	Authors	BAAS No.	Name
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Revision

Revision	Date	Authors	BAAS No.	Reviewed
03	17/02/2025	Natalie Black	19076	Final issued with development applicant for submission

SUMMARY

Anderson Environment & Planning (AEP) was commissioned by Monteath & Powys on behalf of Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle (the proponents) to undertake a Streamlined Biodiversity Development Assessment Report (SBDAR) over land identified as 20 & 20A Cantwell Road and 60 New England Highway, Lochinvar, NSW (Lot 1 DP1299958, Lot 2 DP1299958, Lot 2 DP1214402) and adjoining road reserves of New England Highway and Cantwell Road located within the Maitland City Council Local Government Area (LGA) of New South Wales.

This report has been prepared to meet the requirements of the *Biodiversity Assessment Method 2020* (BAM) established under Section 6.7 of the *Biodiversity Conservation Act 2016* (NSW). This assessment utilises methods applicable to the 'Small Areas' module, detailed within the BAM Order 2020 to identify biodiversity values inherent within the site, including known and potentially occurring threatened species and ecological communities, and quantifies impacts of the proposal upon these values.

The Proponents are proposing a subdivision of Lot 1 DP1299958, Lot 2 DP1299958, Lot 2 DP1214402 with residential development including infrastructure and a creek road crossing with the remainder of the site proposed to be retained. The proposal is zoned R1 and C3 and is not Biodiversity Values (BV) mapped. The proposal trigger is the clearing of 0.5ha of native vegetation triggering entry into the Biodiversity Offset Scheme (BOS).

The Subject Lands is currently vacant with no existing infrastructure and has been impacted by historical and current agricultural usage.

Within the Subject Site, two (2) Plant Community Types (PCTs) were identified:

- 0.39ha of PCT 3433 – *Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest* (Severely Degraded); and
- 0.11ha of PCT 4023 – *Coastal Valleys Riparian Forest* (Poor).
- 15ha of Vegetation determined as "Planted Native" due to the presence of *Cynodon dactylon* was also identified on site and is assessed thereafter, area not included in the clearing area threshold.
- 1.15ha of Non-Native.

The proposal will regenerate approximately 2.33ha of native vegetation. As part of this proposal to avoid impacts, the proposal has been designed to utilise where possible the areas of lowest biodiversity values and avoid and minimise impacts to the areas of higher value and surrounding vegetation whilst retaining higher valued habitat and connectivity.

Fauna species recorded were typical of those expected in this locality and in this type of remnant habitat with existing connection to larger patches of habitat offsite (>500ha). The SAI listed species Swift Parrot was identified via Important Areas habitat mapping within the Study Area, and therefore presence and impact is assumed and an SAI impact assessment undertaken.

Avoid and minimise principles were considered during this assessment, whereby the location of the proposed works is designed to utilise the most degraded part of the Study Area with the avoidance of higher valued vegetation and habitat with connection to the surrounding landscape.

Biodiversity values were assessed for the Development footprint, resulting in the calculation of Biodiversity Offsets being determined for the Subject Site.

It is noted that the PCTs identified on site are not associated with a Commonwealth Listed Threatened Ecological Community (TECs) and no additional assessments were required for TECs at a Commonwealth level. It is not anticipated that a Commonwealth referral would be required as part of this proposal.

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Shortened Terms

Assessment Area	Area within a 1500m buffer of the Subject Site
APZ	Asset Protection Zone
BAM	Biodiversity Assessment Method Order (2020) that determines: • Methodology applicable to quantifying biodiversity values inherent within a development site; • Avoid and mitigation efforts required to be employed as part of any development proposal; and • Number and class of credits required to offset residual impacts of the proposal upon the biodiversity values therein.
BC Act	Biodiversity Conservation Act 2016 (NSW)
BCS	Biodiversity, Conservation and Science Directorate
Biodiversity Credit Report	Specifies the number and type of biodiversity credits required to offset the impacts of a development.
BAM Calculator	The online tool used to interpret site survey data and regional location information to quantify ecosystem and species credits required / generated at a development / stewardship site.
BESS	Battery energy storage system
Biodiversity credits	Ecosystem or Species Credits required to offset the loss of biodiversity values on a development site.
Biodiversity offsets	Specific measures that are put in place to compensate for impacts on biodiversity values.
Biodiversity values	The composition, structure, and function of ecosystems, and threatened species, populations and ecological communities, and their habitats.
BRW	Biodiversity Risk Weighting
CEEC	Critically Endangered Ecological Community
Council	Mid-Western Regional Council
DAWE	Former Commonwealth Department of Agricultural, Water and Environment
CDCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DoEE	Former Commonwealth Department of Energy and the Environment.
DPE	Former NSW Department of Planning and Environment
DCCEEW	State Department of Climate Change, the Environment and Water
DPI	NSW Department of Primary Industries
Ecosystem credit	The class of biodiversity credits created or required for the impact on EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur within a vegetation type.
EEC	Endangered Ecological Community
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>

EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EIS	Environmental Impact Statement
IBRA	Interim Biogeographic Regionalisation for Australia
Important Wetland	An Important Wetland is a wetland listed under the Directory of Important Wetlands of Australia (DIWA, Environment Australia 2001) or an area included under the <i>State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 2 Coastal Management</i> .
LLS Act	NSW Local Land Services Act 2013
Local Wetland	Local Wetland is defined as an area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle (DPIE 2017a).
HBT	Hollow-bearing tree as defined in the BAM.
DPIE	Former NSW Office of Environment and Heritage.
PFC	Projected Foliage Cover
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
Study Area	The Study Area includes the entirety of Lot 1 DP1299958, Lot 2 DP1299958, Lot 2 DP1214402 and a portion of Cantwell Road Reserve. The Study Area was investigated to identify areas suitable for development.
Subject Lands	The Subject Lands consists of the proposed development footprint and associated impacts including upgrades to Cantwell Road.
Species credit	Class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area based on habitat surrogates.
SVTM	NSW State Vegetation Type Map 2023
TBDC	Threatened Biodiversity Data Collection.
TEC	Threatened Ecological Community
VIS	Vegetation Integrity Score

Declarations

i. Certification under clause 6.15 *Biodiversity Conservation Act 2016*

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the *Biodiversity Conservation Act 2016* (BC Act).

Signature:

Date: 17/02/2025

BAM Assessor Accreditation no: 19076

This BDAR has been prepared to meeting the requirements of BAM 2020. **Appendix A** provides an assessment of compliance with the minimum information requirements outlined in BAM Appendix L.

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence SL101313;
- Animal Research Authority (Trim File No: 14/600(2)) issued by NSW Agriculture; and
- Animal Research Establishment Accreditation Number 53724.

As the principal author and certifier, I, Natalie Black (BAAS: 19076), make the following certification:

- This report has been written to comply with the requirements of the BAM 2020 and obligations outlined within the BAM Assessor Code of Conduct and includes, in the opinion of the writer, a true and accurate account of the species recorded, or considered likely to occur within the Survey Area, and inferences of such for biodiversity credit calculations;
- Anderson Environment and Planning have no actual, potential or perceived conflicts of interest with Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle. Anderson Environment and Planning has received commercial payment for consulting services and assessment by Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle for this project;
- BAM Assessment methodology, as well as Commonwealth, state and local government policies and guidelines formed the basis of project surveying methodology, unless specified departures from industry standard guidelines are justified for scientific and/or animal ethics reasons;
- All research workers have complied with relevant laws and codes relating to the conduct of flora and fauna research, including the *Animal Research Act 1995*, *Biodiversity Conservation Act 2016* and the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes*; and
- This report has been written to comply with the requirements of the *Biodiversity Conservation Act 2016* and *Biodiversity Conservation Regulation 2017* as outlined in the below Table.

Principal Author and Certifier:

Natalie Black

Senior Environmental Manager

Anderson Environment & Planning

BAAS no. 19076

Calculator Ref: 00037142/BAAS19076/24/00048759

17 February 2025

Biodiversity Conservation Act, 2016 (BC, Act) Section 6.15 Currency of biodiversity assessment report	
1. A biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted.	I, Natalie Black (BAAS: 19076) declare that I prepared the BDAR and all BDAR amendments for the relevant application on the basis of the requirements within BAM 2020 as at the specified date (below).
2. A relevant application is an application for planning approval, for vegetation clearing approval, for biodiversity certification or in respect of a biodiversity stewardship agreement.	Not applicable to this application.
<i>Biodiversity Conservation Regulation, 2017 (BC Regulations) Clause 6.8 Content of biodiversity development assessment reports (section 6.16)</i>	
A biodiversity development assessment report must include—	
1. the number and classes of biodiversity credits required to be retired in accordance with the like-for-like requirements of the offset rules, and	Addressed within Section 2.8.3 to Section 2.9 of this BDAR
2. the number and classes of biodiversity credits that could be retired in accordance with the variation rules (in any case in which the proponent of the development proposes to use the variation rules), and	Addressed within Section 2.8.3 to Section 2.9 of this BDAR
3. details of any proposal to fund a biodiversity conservation action in accordance with the offset rules, and	Not applicable to this application.
4. details of any ecological rehabilitation of a site impacted by mining under a mining lease that is proposed as a measure to offset or compensate for those impacts, and	Not applicable to this application
5. the date of the report and the requisite certification under section 6.15 of the Act, and	As below.
6. details of the accreditation of the person preparing the report and of the qualifications and experience of any other person commissioned to conduct research or investigations that are relied on in preparing the report, and	As above and Appendix J
7. any other information required by the biodiversity assessment method or ancillary rules to be included in the report.	Refer Appendices for contributing investigations, results and contributing reports prepared by other Professional consultants
6.5 Ancillary rules of Environment Agency Head for purposes of biodiversity offset and variation rules	
(4) If the ancillary rules are changed, a biodiversity assessment report may, during the period of 90 days after the rules were changed, be prepared on the basis of the rules in force before the change, but only if the report states that it has been prepared on that basis.	This report has been prepared in accordance with all ancillary rules prior to 90 days from the date of certification. All ancillary rules after the 90 days have not been included in this assessment.

ii. Details and experience of author/s and contributors

This report was written and certified by Natalie Black (BAAS: 19076) of Anderson Environment & Planning.

The below table acknowledges the Contributing Ecologists who undertook, fieldwork, research or investigations, data analysis, and mapping that are relied on in preparing the report.

Staff	Title/Qualification	Tasks
Craig Anderson	Director BAppSc (EAM) BAAS: 18002	Scientific advice
Ian Benson	Co-Director & Principal Ecologist BEng (Civil) GradDipSc (Ecology) BAAS: 18147	Scientific advice
Natalie Black	Senior Environmental Manager / Works Coordinator BSc (Hons), Master Planning, Cert IV (TA) BAAS: 19076	Accredited Assessor, Lead Author, Certifier.
Thomas Stephens	Project Manager BEnvScMgt, DipArb	Project Management, GIS
Brendon Young	Senior Ecologist M EnvMgt (Water Resources), BAppSc.(Fisheries) (Hons), GradCert. Fish Cons. and Mgmt	Contributor, conducting research or investigations that are relied on in preparing the report. Watercourse assessment and Aquatic surveys
Jarod Baxter	Ecologist BSc Marine and Systems Management	Contributor, conducting research or investigations that are relied on in preparing the report. Watercourse assessment and Aquatic surveys
Oliver Saunders	Ecologist BSc Eco/ Con & Biodiversity Mgmt. -	Contributor, conducting research or investigations that are relied on in preparing the report. PCT Determination
Kathleen Bushel	Ecologist BSc. (Marine Biology)	Contributor, conducting research or investigations that are relied on in preparing the report. GIS Analysis
Byron D'yager	Ecologist / Botanist BSc (SusResMgmt), Cert 3 Cons&LandMgmt	Contributor, conducting research or investigations that are relied on in preparing the report.
Dr Maria Jedensjo	Ecologist PhD (Natural Science), BSc (Marine biology), MSc (Ecology), Cert III Cons & Land Mgt	Contributor, conducting research or investigations that are relied on in preparing the report.
Yann	Senior Ecologist BEnv&ResMgt, Dip Cons Land Mgt	BAM Plots and Floristic Survey
Cat Scobie	GIS Officer Grad. Dip. Spatial Science M Comm. Des.	GIS Analysis

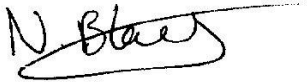
iii. Conflict of interest

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

There are no known conflicts of interest between AEP staff or Directors and the proponent of the development or their agents. AEP has received commercial payment from Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle for provision of professional consulting services in the assessment and production of this BDAR and other associated documents.

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature:



Date: 17/02/2025

BAM Assessor Accreditation no: 19076

Stage 1 – Biodiversity Assessment

1.0 Introduction

1.1 Proposed Development

1.1.1 Development Overview

Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle proposes to subdivide Lots 1 & 2 DP 1299958, along with minor boundary adjustment of Lot 2 DP12144402 to facilitate the road upgrade required for the development.

The proposed subdivision requires consent under Part 4 of the EP&A Act.

1.1.2 Location

The proposed development is located at 20 & 20A Cantwell Road and 60 New England Highway and, Lochinvar Lot 1 DP1299958, Lot 2 DP1299958, Lot 2 DP1214402 (**Figure 1**). The Subject Land is situated within the Maitland Local Government Area (LGA) in the Lower Hunter Region of NSW (**Figure 2**). The Lots fall under C3 and R1 zoning, primarily comprising agricultural land that has been subject to both historical and ongoing farming practices. The proposed subdivision and road developments intersect with a mapped watercourse, which is designated as 'Key Fish Habitat.' The location of the Subject Land in relation to the wider area is shown in **Figure 2**.

1.1.3 Proposed development

Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle C/- Monteath & Powys are proposing to subdivide Lots 1 & 2 DP 1299958, along with minor boundary adjustment of Lot 2 DP12144402 to facilitate the road upgrade required for the development. Associated infrastructure to be constructed as part of the Project includes two detention basins to allow overflow from the drainage reserve congregate. This will also include the development of 10 roads and one unformed road extending from Cantwell Road on the East.

The development layout is shown in **Appendix A**.

1.1.4 Other documentation

The following documentation relevant to biodiversity has been submitted with the proposed development:

- Aquatic Ecology Report (AER) (AEP 2025a).
- Biodiversity Management Plan (BMP) (AEP 2025b).
- Waterfront Land Assessment Report (WLAR) (AEP 2025c).
- Stormwater Management Plan (GCA Engineering Solutions), (2025).
- Civil Plans (GCA Engineering Solutions), (2025).



Legend

- Study Area
- Development Footprint
- HydroArea
- Hydroline
- Boundary Points

Id	Longitude	Latitude
1	-32.693199	151.455994
2	-32.693802	151.460999
3	-32.695999	151.460007
4	-32.6959	151.459
5	-32.6973	151.457001
6	-32.697102	151.455002
7	-32.699001	151.455002

Address: 20 & 20A Cantwell Rd and 60 New England Hwy, Lochinvar NSW
Client: Trustee RCC Diocese M N | AEP Ref: 4951 | Date: January 2025

Imagery: NearMap
Spatial Reference: GDA2020 MGA Zone 56

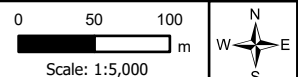


Figure 1 - Site Map



Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan



Legend

- Study Area
- Cadastre
- 1500m Assessment Buffer
- Native Vegetation Extent
- Hydroline
- HydroArea
- NSW Mitchell Landscapes
- IBRA Subregions

Strahler Stream Order

- 1st order - 10m
- 2nd order - 20m
- 3rd order - 30m
- 4th order - 40m

Address: 20 & 20A Cantwell Rd and 60 New England Hwy, Lochinvar NSW
Client: Trustee RCC Diocese M N | AEP Ref: 4951 | Date: January 2025

Imagery: NearMap
Spatial Reference: GDA2020 MGA Zone 56

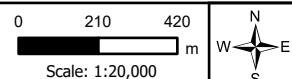


Figure 2 - Site Location



Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan

1.2 Site Details

Table 1 outlines the site details used to identify the Subject Lands and surrounds.

Table 1: Site Details

Detail	Comments
Client	Trustee of the Roman Catholic Church for the Diocese of Maitland Newcastle C/- Monteath & Powys
Address	60 New England Highway and 20 & 20A Cantwell Road, Lochinvar NSW
Title(s)	Lot 1 DP1299958 Lot 2 DP1299958 Lot 2 DP1214402
Study Area	The Study Area encompasses the entirety of Lot 1 & 2 DP1299958 and partial Lot 2 DP1214402 and all upstream tributaries as mapped by <i>Water Management (General) Regulation 2018</i> hydroline spatial data 1.0 and associated WFL (Figure 1).
Subject Site	The Subject Lands encompasses the entirety of Lot 1 & 2 DP1299958 and partial Lot 2 DP1214402.
LGA	Maitland City Council
Zoning	C3 - Environmental Management: (pub. 21-4-2023) R1 - General Residential: (pub. 21-4-2023)
Current Land Use	The Study Area is a fenced paddock consisting of unmanaged grassland and is currently used as cattle pasture.
Surrounding Land Use	The surrounding land is predominantly low density residential and rural residential properties to the east and west, and large lot rural property to the north. The St Joseph's College Diocese of Maitland Newcastle is immediately adjacent to the south and east, and the New England Highway (NEH) borders the southernmost boundary.

1.3 Biodiversity Offsets Scheme entry

Area Clearing Threshold

The Area Clearing threshold trigger is as follows; “*The area threshold varies depending on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan (LEP)), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP). The area threshold applies to all proposed native vegetation clearing associated with a development proposal*”.

The minimum lot size within the Study Area has been specified in the LEP as 450m², which falls within the minimum lot size category of **<1ha** and consequently the area clearing threshold of **>0.25ha** applies (refer **Table 2**). The removal of 0.5ha of native vegetation is greater than 0.25ha and therefore the proposal requires assessment under the BOS. 15ha of Planted Native vegetation was not included in the clearing threshold assessment.

Table 2: Area Clearing Thresholds (BC Act)

Minimum lot size	Threshold for clearing, above which the BAM and offsets scheme apply
< 1ha	>0.25ha
1ha to <40ha	>0.5ha.
40ha to <1000ha	>1.0ha

Minimum lot size	Threshold for clearing, above which the BAM and offsets scheme apply
>1000ha	>2ha

In accordance with Appendix C: Streamlined assessment module – Small area of the BAM, the impact to native vegetation is less than 1.0ha and as such the Small Area Development Module has been applied.

1.4 Excluded Impacts

The site contains land excluded from the LLS Act under the NSW *Local Land Services Act 2013* (LLS Act). The Native Vegetation Regulatory Map (NVR Map) is still in a draft stage, and there are currently two interim maps:

- *In force*: Transitional Native Vegetation Regulatory Map (DCCEEW 2024e)
- *No legal effect*: Draft Native Vegetation Regulatory Map (DCCEEW 2024f)

Category 1-exempt land does not occur within the Study Area.

1.5 Matters of National Environmental Significance

A Protected Matters Search of an area of 5km radius of the Subject Lands was conducted in September 2024 for Matters of National Environmental Significance as relevant to the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act). Results of the protected matters search are provided in **Appendix D**.

It is considered unlikely the proposed development will impact MNES and no referral is recommended as required under the EPBC Act.

1.6 Information Sources

Information and spatial data provided within this SBDAR has been compiled from various sources including:

- Aerial Photograph Interpretation (API) of the site and surrounding locality (Google 2024, SIX Maps and historical);
- Current and historical photographs of the Subject Land;
- Survey data collected within the Subject Land (May and June 2024);
- Draft and Transitional Native Vegetation Regulatory (NVR) Mapping;
- Land-use mapping which identifies existing and historical agricultural land use in New South Wales under the Australian Land Use and Management (ALUM) Classification as shown in the NSW Landuse Mapping (2017);
- State survey guidelines (DPIE 2020, DCCEW 2024c);
- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities. Working Draft* (DEC, 2004).
- NSW *State Vegetation Type Map* (DCCEW, 2023);
- eSPADE Soil profiles and Data (<https://www.environment.nsw.gov.au/eSpade2Webapp>);
- DPE BAM – Important Areas Map to determine whether the site is mapped as Swift Parrot, Regent Honeyeater, Migratory Shorebird and Plains-wanderer Important Areas;
- PlantNET NSW (<http://plantnet.rbgsyd.nsw.gov.au/>); and
- Anecdotal records.

In addition, database searches were carried out, namely:

- Review of flora and fauna records held by the DCCEEWS Atlas of NSW Wildlife within 100km² of the site (October, 2024) and within the wider Maitland LGA; and
- Review of flora and fauna records held by the DCCEEWS Protected Matters Search within a 10km radius of the site (October 2024).

2.0 Methods

2.1 Site context methods

2.1.1 Landscape Features

Landscape features were identified according to Section 3.1 of the BAM using a combination of desktop review and field survey methods. This included:

- Review of International Biographic Regionalisation for Australia (IBRA) regions and subregions;
- Assessment of habitat connectivity;
- Assessment of rivers, streams, estuaries and wetlands;
- Review of the register of areas of Outstanding Biodiversity Value;
- Identifying vegetation types, dominant canopy, mid-storey and groundcover species;
- Defining vegetation formation and class; and
- Assessing landform and landscape design.

2.1.2 Native Vegetation Cover

The percentage native vegetation cover was assessed according to Section 3.2 of the BAM, and a 1500m buffer was applied to the edge of the Subject Land. Native vegetation was ground-truthed within the Study Area through field surveys in May and June 2024.

Native vegetation within the broader 1500m was identified through the analysis of vegetation datasets and satellite imagery.

2.2 Native Vegetation

2.2.1 Existing Information

Plant Community Types (PCTs) within the Subject Land were determined according to BAM Section 4.2. The State Vegetation Type Map (SVTM) was interrogated to determine the likely ecological communities present within the site as shown in **Figure 3**.

Ground-truthing of vegetation by AEP in 2024 was the primary source of data for PCT determination in the present assessment. This included an assessment of dominant species, landscape position, geomorphology, and vegetation structure. All vegetation communities within the Subject Land were identified and assessed against relevant threatened ecological communities (TECs).

An assessment of TECs and PCTs is provided in **Sections 4.2 and 4.3** of this report.

2.2.2 Mapping Native Vegetation Extent

Flora surveys were undertaken by AEP in May and June 2024 to ground-truth native vegetation, determine PCTs and condition classes, derive vegetation community types, and meet relevant survey guidelines. This involved the use of plot-based surveys as described in Section 2.2.3.

2.2.3 Plot-Based Floristics Surveys

Plot-based floristic surveys were undertaken by AEP in May and June, 2024 to identify the most likely Plant Community Types within the Subject Site. The surveys were stratified and targeted to assess the expected environmental variation and address any gaps in existing mapping and information. Surveys included:

- Ground-truthing of regional vegetation mapping to identify all vegetation communities present onsite as well as segregate vegetation zones according to condition and current management practices.
- Identification of all vascular plant species encountered during fieldwork. Subject Lands coverage was both systematic to ensure all key points of the site were checked, and therein the Random Meander Technique (Cropper 1993) was utilised to maximise species encountered.
- The plot-based floristic vegetation survey is based on a 20m × 20m plot (or 400m² equivalent for linear areas). The assessor must assess the plot for the information contained in Table 1 of BAM 2020 and record the data in the BAR.
- Six (6) BAM plots were undertaken on site by AEP within the remnant native and other vegetation present within the Subject Lands within two apparent vegetation zones. All plots were located randomly following a preliminary site inspection. Plot locations were adjusted to consider factors such as the riparian zone.
- Plot 1 & 6 were constrained by the limited extent of the vegetation zone in which it was located. As a result, a modified plot was conducted in the riparian zone in order to fit within the constraints of the vegetation zone.

A summary of the plot data and field sheets are provided in **Appendix F**. The location of BAM Plots and ground-truthed vegetation mapping is provided in **Figure 4**.

2.2.4 Vegetation integrity survey

The total area of each vegetation zone was calculated using GIS, and the minimum number of BAM plots required was based on Table 3 of BAM Subsection 4.3.4. BAM plot locations were initially randomly assigned via GIS, given the highly disturbed nature of the site, BAM plots were located within parts of the vegetation zone that were most representative.

2.3 Threatened flora survey methods

2.3.1 Review of Existing Information

A review of literature and datasets was undertaken to develop a list of species to be targeted during the threatened flora species surveys including:

- NSW BioNet Atlas – searching within 100km² search area. Further consideration was given to species that have been recorded with the Maitland LGA;
- Protected Matters Search Tool (PMST) (Cth DCCCEW 2024) within a 10km buffer;
- NSW BioNet Threatened Biodiversity Data Collection (TBDC); and
- The Biodiversity Assessment Method Calculator (BAM-C).

Flora species were assessed against the habitat features identified within Subject Lands to determine the suitability of the area to support these species. This involved cross-referencing species information in the TBDC and scientific literature with relevant information from the site. The small area module only requires assessment of species listed as at risk of Serious and Irreversible Impacts (SAII). Non-SAII species were considered and manually added into the BAM-C.

2.3.2 Habitat constraints assessment

Habitats and microhabitats were assessed in May 2024 to identify specific habitats and microhabitats for threatened species within the Subject Land. Exclusions were made based on habitat constraints, geographic limitations, or microhabitat requirements. Out of the species identified through database and literature searches as potentially occurring on the Subject Land, no threatened flora species were selected for targeted searches.

2.3.3 Field Surveys

Vegetation surveys were conducted on May and June 2024 by AEP ecologists. Threatened flora surveys were undertaken in accordance with the BAM and methods described in the threatened flora survey guidelines (DPIE 2020). Threatened flora surveys were conducted within areas of suitable habitat within the Subject Land as shown in **Figure 5**.

2.4 Threatened Fauna Survey Methods

2.4.1 Review of existing information

Threatened fauna were identified utilising information sources described in Section 2.3.

2.4.2 Habitat constraints assessment

Habitat assessment was undertaken by AEP in May 2024 which involved analysis of specific habitats that could be used by threatened species such as hollows, Koala feed trees, watercourses and rocky outcrops and other features that could be utilised by threatened species.

2.4.3 Field surveys

No threatened fauna species were identified for inclusion as candidate species. Nevertheless, observations were undertaken including records of any fauna species observed during fieldwork were noted. This included opportunistic sightings of secondary indications (scratches, scats, diggings, tracks etc.) of any resident or migratory species. Searches were also conducted for whitewash, regurgitation pellets and prey remain from Owls, chewed Casuarina cones from Black-Cockatoos, chewed fruit remains from frugivorous birds etc.

2.5 Limitations

No limitations were recognised for threatened flora or fauna species.

3.0 Site Context

3.1 Assessment area

The Assessment Area for the Project includes the Subject Land and the land located within 1500m of the site as shown in **Figure 2**. The Assessment Area totals 1020ha, which primarily consists of agricultural land.

3.1.1 IBRA bioregions and IBRA subregions

Subject Lands occur entirely within the Sydney Basin IBRA Bioregion, and Hunter IBRA Subregion. This information was entered into the BAM-Calculator accordingly.

3.2 Landscape features

Landscape features on the Subject Land are depicted in **Figure 2**, and discussed in further detail in **Table 3**.

Table 3: Landscape Feature Assessment

Landscape Feature	Assessment
Rivers and Streams	An unnamed mapped stream, runs through the Study Area, and a proposed creek crossing is planned running across the watercourse. The watercourse is mapped as 'Key Fish Habitat' under the <i>Fisheries Management Act 1994</i>, and an AER (AEP 2024a) has been conducted to assess impacts. An assessment of potential waterfront land within the Subject Land was undertaken to ground-truth watercourses within the site (AEP 2024d), where the watercourse met the requirements under the Water Management Tool. No wetlands occur within the Subject Land or within proximity to Subject Land.
Wetlands	No Listed Wetlands are mapped within the Study Area
Native Vegetation Extent	Within the Subject Site, two (2) Plant Community Types (PCTs) were identified, with differing conditions: • 0.39ha of PCT 3433 – <i>Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest</i> (Severely Degraded); and • 0.11ha of PCT 4023 – <i>Coastal Valleys Riparian Forest</i> (Poor). • 15ha of Vegetation determined as "Planted Native" due to the presence of <i>Cynodon dactylon</i> was also identified on site and is assessed thereafter. • 1.13ha of Non-Native.
Connectivity Features	The Subject Land is situated in a region that has been extensively modified by agricultural activities. The surrounding land consists primarily of large rural lots used for grazing and cropping, with fenced paddocks that restrict fauna mobility. The landscape features small, isolated pockets of canopy. The site itself is actively grazed, with fencing further limiting viable entry points. Additionally, dispersed trees along the watercourse are unlikely to support dispersal for fauna species such as gliders. The most connected vegetation in the area is associated with the stream, which lacks well-formed riparian vegetation zone, unlike other mapped streams outside the Subject Lands which provides marginal connectivity for moderately mobile species.
Karst, Caves, Crevices, Cliffs, Rock and other Geological Features of Significance	There are no karst, caves, crevices, cliffs, rocks or other geological features of significance on the Subject Land or within the Assessment Area.

Landscape Feature	Assessment
NSW Landscape	Reference to Soil Landscapes of Central and Eastern NSW (DCCEEW, 2024) indicates that the site is located within the Lochinvar, Lovedale and North Eelah Soil Landscapes. The Lochinvar Soil landscape covers the entirety of the Subject Lands, dominating the surrounding area. It is characterised by low, gentle undulating rises and consists of imperfect to well-draining soils. Predominantly Non – calcic brown Soils on gentle slopes with Brown podzolic Soils in steeper areas. Some Yellow Solodic Soils are present on the mid to lower slopes of steeper hills and within some drainage lines. The Lovedale Landscape only encompasses the riparian area of the Subject Lands and is characterised by very gently undulating, low hills on alluvium derived from early-mid Permian sedimentary rocks of the Dalwood and Maitland groups. The soils predominant within this landscape are mostly poor draining Grey Kurosols and Sodosols. Variation can occur in areas with recent soil deposition. Landscape is known to pose a widespread foundation hazard and high run on with poor drainage, with localised streambank erosion and flood hazards. The North Eelah Landscape covers regions of the Subject Lands that are not mapped within the riparian zone. This landscape is typically characterised by undulating rises to rolling low hills on Permian sediments and basalt. Soils are typically well to imperfectly draining, with some rapid draining Lithosols. The North Eelah Landscape is known for widespread sheet erosion and foundation hazards, widespread productive arable land, and localised high run on and seasonal waterlogging.
Soil hazard features	None known on the Subject Site.
Features identified by the Secretary's Environmental Assessment Requirements (SEARs)	Proposal is not a major project.
Areas of Outstanding Biodiversity Value (AOBV) under the BC Act:	No areas of AOBV are present on the Subject Lands and the adjacent lands.

3.3 Native vegetation cover

Native vegetation cover within the assessment area is estimated to be 15.55ha, determined from SVTM 2023 mapping and aerial imagery. **Table 4** summarises the extent of native vegetation cover within the assessment area, as shown in **Figure 2**.

Table 4: Native vegetation cover in the assessment area

Assessment area (ha)	15.5
Total area of native vegetation cover within required buffer (ha)	1020
Percentage of native vegetation cover (%)	1.5 (rounded to 2 as the BAM – C does not allow for decimals in this entry)
Class (0-10, >10-30, >30-70 or >70%)	0-10

4.0 Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

4.1 Native Vegetation Extent

Native vegetation within the Subject Land totals 15.5ha and is shown in **Figure 2**.

4.1.1 Changes to the mapped native vegetation extent

State Vegetation Type Mapping identified the majority of the Subject Lands as 'not classified.' Smaller isolated pockets of vegetation and isolated trees were not mapped as native vegetation (refer to **Figure 3**). Ground-truthing provided a more granular representation of native vegetation as shown in **Figure 4** with two Plant Communities identified.



Legend

- Study Area
- Development Footprint
- Hydroline

State Vegetation Type

- PCT 4089 - Namoi-Upper Hunter River Red Gum Forest
- Not classified

Address: 20 & 20A Cantwell Rd and 60 New England Hwy, Lochinvar NSW
Client: Trustee RCC Diocese M N | AEP Ref: 4951 | Date: January 2025

Imagery: NearMap, downloaded 8/8/2024
Spatial Reference: GDA2020 MGA Zone 56

0 40 80
m
Scale: 1:4,000

Figure 3 - State Vegetation Type Mapping



Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan

4.1.2 Areas that are not native vegetation

Areas on the Subject Land that are not classified as native vegetation include existing infrastructure associated with Cantwell Road and non-native riparian vegetation as shown in **Plate 1** below.



Plate 1: Non – native Riparian Vegetation

4.1.2.1 Non-endemic vegetation assessment – *Cynodon dactylon*

The Subject Lands consists of native, native non-endemic and non-native species as a result of previous clearing for agricultural use.

PlantNet, 2023, describes *Cynodon Dactylon* as a rhizomatous and/or stoloniferous mat-forming perennial, to 0.3m high, rooting at the nodes; culms erect or geniculate. Being distributed widespread through all states and very common; widely cultivated as a lawn grass and for pasture. PlantNet does not discuss the origin of the species as it does with many other natives and non-natives. This is likely to the high level of debate that surrounds the species.

The debate of the origins of the species started back in 1810 with Robert Brown describing samples he had collected as an introduced species and also by Woolls in 1867, who wrote, *Cynodon Dactylon* was rapidly replacing the native grass *Themeda australis* in grazing areas, considering the species to be introduced from the East Indies (Langdon, 1954). Langdon also presented the case that associated fungal parasites of *Cynodon dactylon* are a rust and a smut, fungi whose arrival in Australia appears in the early 1800's, soil records show it was not present before this time. Therefore, Langdon (1954) concluded it was introduced as fodder for livestock.

Friedel, 2017, also states that the species was "deliberately introduced into Australia for use in crops, pasture, gardens and horticulture". More recently, Identic Pty Ltd, 2016, stated "*the species most probably originated from sub-Saharan Africa and/or on islands in the western parts of the Indian Ocean*".

The Commonwealth Department of the Environment (2023), *The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin in Community and Species Profile and Threats Database*, states in Sections 11.1 and 11.3 that "*Cynodon dactylon* (non-native)", confirming its status with the Commonwealth department as exotic.

The species has become dominant in most communities even wetlands in the western division of NSW. It can survive in times of drought and other harsh conditions such as saline soils, floods, etc and given it is thought to have been introduced in the 1800s it has replaced other native species that may not have been identified, resulting some species in the western division being dependant on its presence,

such as Night Parrot, Dusky Hopping Mouse and Plains Wanderer. Hence the Department of the Environment (2023), provides guidance measures on how to manage the species and return native grasses to these environments with a focus on the Great Artesian Basin.

The Department of Primary Industries (Agriculture2023, Local Land Services and Department of Industry and Investment, promote the planting / sowing of *Cynodon dactylon* at a rate of 6-10kg on well drained and alluvial soils. The species tolerates saline, heat conditions, drought tolerance, and is flood tolerant. *Cynodon dactylon* can adapt to all conditions such as shade, full sun and even wetter areas (Department of Industry and Investment, 2011). The species has great pasture features, such as the ability to adapt and high tolerance to a changing environment, it also binds soils and prevents erosion and provides fodder for domestic stock annually and it is readily available. Hence its high use in the Hunter catchment for pasture improvement (Department of Primary Industries, 2023).

Within the Hunter *Cynodon dactylon* is heavily used for turf or lawn. Turf farms throughout the region farm the species. The species is also used in large subdivisions as it is quick growing has tough, mat-forming rhizomes which binds the soils; it tolerates heat and full sun; and the matting rhizomes limit other species such as weeds colonising the new lots.

Morgan, 1998 has researched the decline in species of *Themeda* species within grasslands, *Cynodon dactylon* and other invasive species were dominating especially in areas of higher soil phosphorus. Morgan, 1998, considered this change as being permanent naturalising these species, recommending management actions to reduce if not eradicate the species due their invasive properties and the significant reduction in diversity of natives. Such management actions are applied throughout the Hunter Catchment within the Bush Regeneration field. *Cynodon dactylon* is a target species for eradication as it is considered an invasive weed. The species prevents diversity within a community with its ability to matt the top 10cm of topsoil, prohibiting orchids, herbs and forbs from persisting. The reduction in diversity within a Bush Regeneration site results in targets not being achieved and limits fauna use.

It is noted that recognising the species as an endemic native, will significantly impact the regeneration within the Hunter, halting the progression to eradicate the species from the communities. AEPs collective knowledge and expertise within the Hunter Catchment Area do not agree with the species being considered a native species within Hunter Catchment Area and are concerned such a decision will have a significant impact Bush Regeneration and on the diversity within the region resulting in the loss of endemic species.

4.1.2.1.1 Planted Native Assessment BAM 2020

While *Cynodon Dactylon* is considered native under the NSW herbarium. The site has historically been managed for agricultural grazing whereby this species was likely sown and is generally assumed as such east of the dividing range. As such, *Cynodon dactylon* (Common Couch) present within the Subject Lands was classified as 'planted native vegetation' and BAM 2020 Appendix D applied (**Table 5**). This vegetation type is not required to be further assessed using the BAM and was thus excluded from any credit or offset calculations.

AEP acknowledges that Maitland City Council considers the species as a planted native, hence the assessment for the species has been undertaken as a planted native.

This assessment module has been used to assess this site after detailed assessment against the decision-making framework in **Table 5** and consultation with the Maitland City Council and BAM Support.

Until MCC undertake a whole of Government assessment of this species AEP has used **Appendix D.2** of the BAM 2020 to assess *Cynodon dactylon* present within the Study Area. It is noted that if the surveys show suitable habitat or record sighting of threatened species the assessor must apply **Section 8.4** of the BAM to mitigate and manage impacts as credits are not applied to offset the proposed impacts. The assessor must assess the suitability of the planted native vegetation for use by threatened species and record any incidental sightings or evidence (e.g. scats, stick nests) of threatened species credit species (flora and fauna) using, inhabiting or being part of the planted native vegetation. This species does not represent suitable habitat for any threatened species identified on site and as such no further assessment is required.

Table 5: Decision-Making Key (Appendix D BAM, 2020)

Item	Standard for Assessment	Options	AEP Assessment
1	Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	Yes - The planted native vegetation must be allocated to the best-fit PCT and the BAM must be applied. No - Go to 2.	The Subject Lands is reflective of a diverse range of plants such as: Listed weed species, exotics, native vegetation from other regions / States and endemic vegetation. The diversity of species is consistent with the site's previous land use as grazing pasture. The general flora assessment and BAM Plots undertaken showed the Subject Lands did not contain a mosaic of planted species or remnant native vegetation that could be assigned to a Plant Community Type (PCT). NO
2	Is the planted native vegetation: a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat	Yes - The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. No - Go to 3.	The plants within the Subject Lands were not planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b. the primary objective was not to replace or regenerate a plant community type or a threatened plant species population or its habitat. NO
3	Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following:	Yes - The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. No - Go to 4.	Refer below.
3a	A species recovery project		The planted vegetation within the Subject Lands was not planted / Translocated for the purpose of a species recovery project. NO
3b	Saving our Species project		The planted vegetation within the Subject Lands was not planted / Translocated for the purpose of Saving our Species project. NO
3c	Other types of government funded restoration project.		The planted vegetation within the Subject Lands was not planted / Translocated for the purpose of other types of government funded restoration project NO

Item	Standard for Assessment	Options	AEP Assessment
3d	Condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat		The planted vegetation within the Subject Lands was not planted / Translocated for the purpose of Condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat NO
3e	Legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act)		The planted vegetation within the Subject Lands was not planted / Translocated for the purpose of legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g. Remediation Order for clearing without consent issued under the BC Act or the <i>Native Vegetation Act</i>). NO
3f	Ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan.		The planted vegetation within the Subject Lands was not planted / Translocated for the purpose of Ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan. NO
3g	Approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000).		The planted vegetation within the Subject Lands was not planted / Translocated for the purpose of an approved vegetation management plan (e.g. as required as part of a Controlled Activity Approval for works on waterfront land under the <i>NSW Water Management Act 2000</i>). NO
4	Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation?	Yes - Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). No - Go to 5.	The planted vegetation within the Subject Lands was not planted / Translocated for the purpose of a voluntarily revegetation, environmental rehabilitation or restoration without a legal obligation to secure or provide for management of the native vegetation. NO
5	Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as:	Yes - Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). No - Go to 6.	The planted vegetation within the Subject Lands was not planted / Translocated for the functional, aesthetic, horticultural or plantation forestry purposes. NO

Item	Standard for Assessment	Options	AEP Assessment
	windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms?		
6	Is the planted native vegetation a species listed as a widely cultivated native species on a list approved by the Secretary of the Department (or an officer authorised by the Secretary)?	Yes - Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). No - There may be other types of occurrences of planted native vegetation that do not easily fit into the decision-making key above. Assessors should contact the BAM Support mailbox at bam.support@environment.nsw.gov.au for further advice on using the BAM to assess other types of occurrences of planted native vegetation.	The planted vegetation within the Subject Lands is not planted native vegetation identified as being widely cultivated on a list approved by the Secretary of the Department (or an officer authorised by the Secretary). NO

4.2 Plant Community Types

4.2.1 Overview

The Subject Lands contains three main areas with both native and exotic vegetation. The majority of the site is dominated by degraded cleared planted native grassland. The riparian zone intersecting the site contains highly disturbed native vegetation with a fragmented monoculture of *Casuarina glauca* dominating the canopy and an absent mid-stratum. A small area of the site, to the east of the riparian zone has native vegetation in a regenerating state.

The BAM requires the identification of the PCT or the most likely PCTs, and all TECs, on the Subject Site. The identification must be in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification system. The identification of TECs must be consistent with the NSW Threatened Species Scientific Committee Final Determination for the TEC. Diagnostic species recorded on site during fieldwork that support the determination of PCTs are shown in **Tables 6 and 7** below.

Plot 1 was undertaken within canopy vegetation on site, which returned PCT 4023 match due to high number of a diagnostic species and its geographical similarities. BAM plot 6 was undertaken within the riparian area, downstream of plot 1, returning PCT 4023 as the best fit for this vegetation. Plot 2 was undertaken in the east of the Subject Site, within the scattered patches of native vegetation in a regenerative state. This vegetation zone returned PCT 3315 match due to the presence of *Hakea sericea*. The other plots were all undertaken in the planted native vegetation throughout the remainder of the Subject Site.

Within the Subject Site, two (2) Plant Community Types (PCTs) were identified, with differing conditions:

- PCT 3433 – *Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest* (Severely Degraded); and
- PCT 4023 – *Coastal Valleys Riparian Forest* (Poor).
- Vegetation determined as “Planted Native” due to the presence of *Cynodon dactylon* was also identified on site and is assessed thereafter.

An abundance of high threat exotic weeds are present throughout the site including *Ehrharta erecta*, *Juncus acutus subsp. acutus*, *Olea europaea*, *Paspalum dilatatum* and *Senecio madagascariensis*.

Fieldwork identified Four (4) vegetation zones within the Subject Lands which are described in **Section 1.4.3**. Ground-truthed PCT and vegetation zone mapping for the Subject Lands is shown in **Figure 4**. BAM plot photographs are included in the body of the report and additional site photographs are provided in **Appendix H**.

4.2.2 Plot to PCT Tool

Assessment of vegetation on site using BAM plot data was undertaken using the Plot to PCT Tool. The following results were produced:

Plot 1:

- PCT – 4016 *Clarence Floodplain Swamp Oak Forest*;
- PCT – 4027 *Estuarine Swamp Oak-Mangrove Forest*;
- PCT – 4028 *Estuarine Swamp Oak Twig-rush Forest*;
- PCT – 4026 *Estuarine Sea Rush Swamp Oak Forest*;
- PCT – 3987 *Far North Floodplain Paperbark-Swamp Oak Forest*.

Plot 2:

- PCT 4089 – *Namoi-Upper Hunter River Red Gum Forest*;
- PCT 4088 – *Southwest Riverflat Red Gum Forest*;
- PCT 4073 – *Lower North Hinterland River Oak Forest*;

- PCT 3328 – *Lower Hunter Red Gum-Paperbark Riverflat Forest*;
- PCT 4081 – *Northwest River Oak-River Red Gum Forest*.

Plot 6:

- PCT 3975 – *Southern Lower Floodplain Freshwater Wetland*;
- PCT 3976 – *Southern Sands Freshwater Lagoon Wetland*;
- PCT 4088 – *Southwest Riverflat Red Gum Forest*;
- PCT 3997 – *Hunter Coast Sandplain Sedge Paperbark Wetland*;
- PCT 3958 – *Castlereagh Gravel Sedgeland*;

The output from the Plot to PCT Tool is attached as **Appendix G**.

4.2.3 PCT Determination and Vegetation Zones Process

The Plot to PCT Tool data is used to inform AEP PCT determination process. The PCT determination process AEP utilises the NSW Government BioNet Vegetation Classification, 2023 webpage including the PCT Data and Bulk Export data spreadsheet to determine the most likely PCTs. The following outlines the process:

1. Determine the State Vegetation Type Mapping Extent based on most recent mapping tools;
2. Determine the IBRA and Sub IBRA zone, this step assist in removing PCTs that are not located within Subject Site;
3. Determine the NSW Landscapes, a map needs to be generated for this step as there may be multiply landscapes within the Subject Site; and
4. Use the floristic results from the BAM Plots, filtering from canopy species through to other ground stratum. Using the BioNet Vegetation Classification is critical in this stage where the frequency of the species present is the leading contributor to refining the PCT as confirmation of presence and absence is identified within this step.

The above steps allow the narrowing of the potential PCTs considered. With further assessment required.

5. Using the BioNet Vegetation Classification and details collected in the field to assess both the vegetation formation and class must be undertaken to ensure the species present are a representation of the community at the Subject Site. For example, some species such as *Eucalyptus robusta*, can be found in both Dry Sclerophyll Forests and Forested Wetlands, which will significantly alter the PCT if not assessed accurately;
6. Determination of LGA, as there are particular plant communities that are restricted to or excluded from LGAs;
7. Geographical Restrictions and elevation are researched, these factors play a significant role in soil types and climatic conditions which impacts the location of flora within NSW;
8. AEP uses E-Spade to determine the local soil types to assist with refining the PCTs; and
9. Other habitat restrictions such as rainfall, tidal, riparian zones, etc are also researched against the BioNet Vegetation Classification results and data collect on site.

The above steps are generally undertaken in order to ensure the PCTs within the Subject Lands are an accurate reflection of the vegetation communities occurring within the areas.

Detailed justification utilised by the Accredited Assessor and Botanist for PCT determination is provided in **Appendix G**.

4.2.4 Justification of PCT selection

The BAM's assessment module requires the identification of the PCT or the most likely PCTs, and all TECs, on the Subject Land. The identification must be in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification system. The identification of TECs must be consistent with the NSW Threatened Species Scientific Committee Final Determination for the TEC.

Diagnostic species recorded on site during fieldwork that support the determination of PCTs are shown in **Table 6**.

Table 6: Species data for Potential PCT determination

	Plot 1
Dominant Species	Upper Stratum: <i>Casuarina glauca</i>
	Mid Stratum: Absent
	Ground Stratum: <i>Cynodon dactylon</i> , <i>Microlaena stipoides</i> , <i>Oxalis perennans</i> & <i>Einadia nutans subsp. linifolia</i>
Potential PCTs	4016, 4027, 4023, 4028
	Plot 2
Dominant Species	Upper Stratum: Absent
	Mid Stratum: <i>Hakea sericea</i>
	Ground Stratum: <i>Cynodon dactylon</i> , <i>aistida vagans</i> , <i>Cymbopogon refractus</i> , <i>Eragrostis elongate</i> , <i>Microlaena stipoides</i> & <i>Sporobolus creber</i>
Potential PCTs	4089, 4088, 3328 & 3433
	Plot 3, 4 & 5
Dominant Species	Upper Stratum: Absent
	Mid Stratum: Absent
	Ground Stratum: <i>Cynodon dactylon</i> , <i>Cymbopogon refractus</i> , <i>Microlaena stipoides</i> , <i>Eragrostis elongate</i> & <i>Sporobolus creber</i> ,
Potential PCTs	Planted Native
	Plot 6
Dominant Species	Upper Stratum: Absent
	Mid Stratum: Absent
	Ground Stratum: <i>Cynodon dactylon</i> , <i>Typha orientalis</i> , <i>Machaerina juncea</i> , <i>Juncus usitatus</i> & <i>Bothriochloa macra</i>
Potential PCTs	4023, 4088, 3976 & 3975

Review of floristic data concluded that plots and PCTs were associated as follows:

- PCT 4023: BAM Plot 1 & 6 – Poor Condition;
- PCT 3433: BAM Plot 2 – Severely Degraded Condition; and
- Planted Native Vegetation: BAM Plot 3, 4 & 5

Further justification is provided in **Appendix G**.

4.2.5 PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

This PCT occurs as an isolated patch in the North East portion of the Subject Lands and is surrounded on all sides by planted native vegetation (refer **Figure 4**). Plant Community Type onsite has been characterised by lower stratum vegetation, predominated by *Cynodon dactylon* and *Eragrostis elongate*. PCT is severely degraded with limited biodiversity and a high cover of exotic groundcover.

Table 7: PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Plot (s)	2
PCT	PCT 3433
PCT Name	Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Dominant Species	Upper Stratum: Absent
	Mid Stratum: <i>Hakea sericea</i>
	Ground Stratum: <i>Cynodon dactylon</i> , <i>aistida vagans</i> , <i>Cymbopogon refractus</i> , <i>Eragrostis elongate</i> , <i>Microlaena stipoides</i> & <i>Sporobolus creber</i>
Vegetation Formation	Dry Sclerophyll Forests (Shrub/Grass sub-formation)
Vegetation Class	Hunter-Macleay Dry Sclerophyll Forests
Per cent cleared value (%)	68.60
Extent of Ground-truthed within Subject Land (ha)	0.39ha



Plate 2: PCT 3433 Severely Degraded

4.2.5.1 Condition State - Severely Degraded

This Plant Community Type occurs in one (1) condition state throughout the Subject Land. Vegetation is dominated by planted native *Cynodon dactylon*, and area is composed of predominantly grass species with one species of regenerating shrub present (*Hakea sericea*). This zone features 3 High Threat Weed species, and a total of 6 exotic species. Vegetation quality is low with 46% of recorded flora diversity consisting of invasive species.

4.2.5.2 Alignment with TECs

PCT 3433 is associated with the BC Act listed Endangered Ecological Community (EEC): *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions* under the BioNet Vegetation Classification.

Table 8: PCT 3433 Assessment of Association with EEC: *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*

Characteristics	Assessment of Vegetation Community – Subject Site
Definition of EEC: <i>Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions</i> is the name given to the ecological community that occurs principally on Permian geology in the central to lower Hunter Valley. The Permian substrates most commonly supporting the community belong to the Dalwood Group, the Maitland Group and the Greta and Tomago Coal Measures, although smaller areas of the community may also occur on the Permian Singleton and Newcastle Coal Measures and the Triassic Narrabeen Group (NSW Department of Mines 1966, 1969).	The site is located in the Maitland Group
Soils: The community is strongly associated with, though not restricted to, the yellow podsolic and solodic soils of the Lower Hunter soil landscapes of Aberdare, Branxton and Neath (Kovac and Lawrie 1991). These substrates are said to produce 'moderately fertile' soils (Kovac and Lawrie 1991).	Reference to Soil Landscapes of Central and Eastern NSW (DCCEEW, 2024) indicates that the site is located within the Lochinvar, Lovedale and North Eelah Soil Landscapes. The Lochinvar Soil landscape covers the entirety of the Subject Lands, dominating the surrounding area. It is characterised by low, gentle undulating rises and consists of imperfect to well-draining soils. Predominantly Non – calcic brown Soils on gentle slopes with Brown podzolic Soils in steeper areas. Some Yellow Solodic Soils are present on the mid to lower slopes of steeper hills and within some drainage lines. The Lovedale Landscape only encompasses the riparian area of the Subject Lands and is characterised by very gently undulating, low hills on alluvium derived from early-mid Permian sedimentary rocks of the Dalwood and Maitland groups. The soils predominant within this landscape are mostly poor draining Grey Kurosols and Sodosols. Variation can occur in areas with recent soil deposition. Landscape is known to pose a widespread foundation hazard and high run on with poor drainage, with

Characteristics	Assessment of Vegetation Community – Subject Site
	localised streambank erosion and flood hazards. The North Eelah Landscape covers regions of the Subject Lands that are not mapped within the riparian zone. This landscape is typically characterised by undulating rises to rolling low hills on Permian sediments and basalt. Soils are typically well to imperfectly draining, with some rapid draining Lithosols. The North Eelah Landscape is known for widespread sheet erosion and foundation hazards, widespread productive arable land, and localised high run on and seasonal waterlogging.
EEC specific assemblage of species: • <i>Acacia parvipinnula</i> • <i>Aristida vagans</i> • <i>Billardiera scandens</i> • <i>Bursaria spinosa</i> • <i>Callistemon linearifolius</i> • <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> • <i>Correa reflexa</i> • <i>Corymbia maculata</i> • <i>Daviesia ulicifolia</i> • <i>Denhamia silvestris</i> • <i>Dianella revoluta</i> var. <i>revoluta</i> • <i>Dichelachne micrantha</i> • <i>Entolasia stricta</i> • <i>Eragrostis brownii</i> • <i>Eucalyptus fibrosa</i> • <i>Eucalyptus punctata</i> • <i>Glycine clandestina</i> • <i>Goodenia rotundifolia</i> • <i>Grevillea montana</i> • <i>Grevillea parviflora</i> subsp. <i>parviflora</i> • <i>Hardenbergia violacea</i> • <i>Lepidosperma laterale</i> • <i>Leptospermum parvifolium</i> • <i>Lissanthe strigosa</i> • <i>Lomandra filiformis</i> • <i>Lomandra multiflora</i> • <i>Macrozamia flexuosa</i> • <i>Melaleuca decora</i> • <i>Melaleuca nodosa</i>	Upper stratum present: Absent Mid stratum present: Absent Ground stratum present: <i>Microlaena stipoides</i> Only one species is present, a commonly occurring groundcover in many PCTs in the Sub – IBRA.

Characteristics	Assessment of Vegetation Community – Subject Site
• <i>Microlaena stipoides</i> • <i>Opercularia diphylla</i> • <i>Ozothamnus diosmifolius</i> • <i>Panicum simile</i> • <i>Paspalidium distans</i> • <i>Persoonia linearis</i> • <i>Phyllanthus hirtellus</i> • <i>Platysace ericoides</i> • <i>Podolobium ilicifolium</i> • <i>Pomax umbellata</i> • <i>Pratia purpurascens</i> • <i>Pultenaea spinosa</i> • <i>Rytidosperma pallidum</i> • <i>Themeda triandra</i> • <i>Vernonia cinerea</i> var. <i>cinerea</i>	
Local Government Area Distribution: This EEC is restricted to a range of approximately 65 km by 35 km centred on the Cessnock – Beresfield area in the Central and Lower Hunter Valley (NPWS 2000). Within this range, the community was once widespread. A fragmented core of the community still occurs between Cessnock and Beresfield. Remnants occur within the Local Government Areas of Cessnock, Maitland, Singleton, Lake Macquarie, Newcastle, and Port Stephens but may also occur elsewhere within the bioregion. Outliers are also present on the eastern escarpment of Pokolbin and Corrabare State Forests on Narrabeen Sandstone.	Maitland LGA
This EEC belongs to a complex of ecological communities, but is identified as a distinct assemblage of species. Other assemblages that may include spotted gum as a dominant species, have geographically distinct distributions outside the core area where this community primarily occurs (Cessnock – Beresfield). These other assemblages include: Coastal Foothills Spotted Gum – Ironbark Forest, Seaham Spotted Gum – Ironbark Forest and Central Hunter Spotted Gum – Ironbark – Grey Box Forest (NPWS 2000).	The dominant species are not present likely due to past agricultural land use.
<i>Eucalyptus fibrosa</i>, <i>Acacia parvipinnula</i> and prickly shrub species occur more frequently or in greater abundance in Lower Hunter Spotted Gum – Ironbark Forest than in the other communities above.	These species are not present likely due to past agricultural land use.
North of the Hunter River and other parts of the Hunter valley indicate the existence of another distinct assemblage dominated by spotted gums and ironbarks on Carboniferous sediments of the footslopes of the Barrington plateau. Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion belongs to the Hunter - Macleay Dry Sclerophyll Forests vegetation class of Keith (2004).	Maitland LGA is located within the Hunter valley

Characteristics	Assessment of Vegetation Community – Subject Site
Is the PCT associated with this EEC (Yes or No)?	No
Is the PCT EPBC listed under a different CEEC or EEC name (Yes or No)?	No
Detailed Justification of Assessment: Only one species is present, a commonly occurring groundcover in many PCTs in the Sub – IBRA. The dominant species are not present this is likely due to the agricultural land use and past clearing.	
Referral Requirements: EPBC Act Listing Status: Not Listed Action: There is no EPBC Act listed TEC associated with the above community. No further assessment was therefore required.	

4.2.5.3 Alignment with EPBC Act listed TECs

A protected matters search within 10km of the Subject Lands was undertaken to identify potential EPBC Act listed TECs that may occur within the Subject Lands refer to **Table 9**.

Table 9: PCT 3433 Assessment of Association EPBC Act listed Endangered Ecological Community

EEC	Status	Association with PCT 3433 (Y / N)	Key Diagnostic	Assessment
<i>Central Hunter Valley eucalypt forest and woodland</i>	Critically Endangered	Y	It occurs in the Hunter River catchment (typically called the Hunter Valley region)	Yes
			It typically occurs on lower hillslopes and low ridges, or valley floors in undulating country; on soils derived from Permian sedimentary rocks	Subject Lands is alluvial flats, river terraces.
			It does not occur on alluvial flats, river terraces, aeolian sands, Triassic sediments, or escarpments	Site occurs on alluvial flats, river terraces
			It is woodland or forest, with a projected canopy cover of trees of 10% or more; or with a native tree density of at least 10 native tree stems per 0.5 ha (at least 20 native tree stems/ha) that are at least one metre in height ¹²	No Canopy species present.
			The canopy of the ecological community is dominated by one or more of the following four eucalypt species: <i>Eucalyptus crebra</i> (narrow-leaved ironbark), <i>Corymbia maculata</i> (syn. <i>E. maculata</i>) (spotted gum), <i>E. dawsonii</i> (slaty gum) and <i>E. moluccana</i> (grey box); OR o a fifth species, <i>Allocasuarina luehmannii</i> (bulloak, buloke) dominates in combination with one or more of the above four eucalypt species, in sites previously dominated by one or more of the above four eucalypt species.	No canopy species present

EEC	Status	Association with PCT 3433 (Y / N)	Key Diagnostic	Assessment
			<i>Allocasuarina torulosa</i> (forest oak/ she-oak, rose she-oak/oak), <i>Eucalyptus acmenoides</i> (white mahogany) and <i>E. fibrosa</i> (red/broad-leaved ironbark) are largely absent from the canopy of a patch.	No canopy species present
			A ground layer is present (though it may vary in development and composition), as a sparse to thick layer of native grasses and other native herbs and/or native shrubs.	Ground covers are present, limited native species are present Mid Stratum: <i>Hakea sericea</i> Ground Stratum: <i>Cynodon dactylon</i>, <i>aistida vagans</i>, <i>Cymbopogon refractus</i>, <i>Eragrostis elongate</i>, <i>Microlaena stipoides</i> & <i>Sporobolus creber</i>
Kurri sand swamp woodland of the Sydney Basin bioregion	Endangered	N	N/A	N/A
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	N	N/A	N/A
Hunter Valley Weeping Myall (<i>Acacia pendula</i>) Woodland	Critically Endangered	N	N/A	N/A
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	N	N/A	N/A
Lowland Rainforest of Subtropical Australia	Critically Endangered	N	N/A	N/A
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	N	N/A	N/A
Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East	Endangered	N	N/A	N/A

EEC	Status	Association with PCT 3433 (Y / N)	Key Diagnostic	Assessment
Queensland ecological community				

4.2.6 PCT 4023 - Coastal Valleys Riparian Forest

This PCT occurs along the riparian corridor bisecting the Subject Lands North to South. Fragments of this PCT occur along the waterway in varying conditions, with by planted native vegetation surrounding the zones on all sides. Plant Community Type onsite has been characterised by riparian vegetation and a remnant patch of canopy vegetation in the southern half of the riparian zone onsite. Patches of remnant plant community type 4023 are present throughout the riparian zone, predominantly consisting of *Typha orientalis* and *Juncus acutus subsp. acutus* with no mid to upper stratum present. Plot 1 has one (1) tree species present *Casuarina glauca*, which is the only canopy cover present, with no other species occupying the upper to mid strata. Ground stratum consists of nine (9) native species, and is dominated by 18 introduced species, with 5 high threat weeds. Primary ground cover species are *Cynodon dactylon* and *Ehrharta erecta*. A high weed load and poor vegetation diversity has resulted in a poor condition area.

Table 10: PCT 4023 - Coastal Valleys Riparian Forest

Plot (s)	1 and 6
PCT	PCT 4023
PCT Name	Coastal Valleys Riparian Forest
Dominant Species	Upper Stratum: <i>Casuarina glauca</i>
	Mid Stratum: Absent
	Ground Stratum: <i>Cynodon dactylon</i> , <i>Microlaena stipoides</i> , <i>Oxalis perennan</i> , <i>Einadia nutans subsp. Linifolia</i> , , <i>Typha orientalis</i> , <i>Machaerina juncea</i> , <i>Juncus usitatus</i> & <i>Bothriochloa macra</i>
PCT Name	Coastal Valleys Riparian Forest
Vegetation Formation	Forested Wetlands
Vegetation Class	Coastal Floodplain Wetlands
Per cent cleared value (%)	78.22
Extent of Ground-truthed within Subject Land (ha)	0.11ha

4.2.6.1 Condition State - Poor

Plant Community Type 4023 is associated with BAM plots 1 & 6 (**Figure 4**) and the VIS for this zone is 45.3. While both plots have scored similarly in the BAM calculator, it is of note that canopy species are absent from Plot 6. High weed load and agricultural disturbance has resulted in a poor and sparse plant community, dispersed throughout the riparian zone.



Plate 3: PCT 4023 Poor Condition BAM Plot 1



Plate 4: PCT 4023 Poor Condition BAM Plot 6

4.2.6.2 Alignment with TECs

PCT 4023 is associated with the BC Act listed Endangered Ecological Community (EEC) *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions* under the BioNet Vegetation Classification. **Table 11** shows the community present within the Subject Lands is not commensurate with the listed EEC.

Table 11: PCT 4023 (Poor) Assessment of Association with EEC: *Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions*

Characteristics	Assessment of Vegetation Community – Subject Site
<i>Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i> is the name given to the ecological community associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less.	The community assessed to be PCT 4023, is shown to be sandy loams, periodically inundated alluvial flats and drainage lines associated with coastal floodplains. Floodplains has active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less.
It generally occurs below 20m (though sometimes up to 50m) elevation, often on small floodplains or where the larger floodplains adjoin lithic substrates or coastal sand plains in the NSW North Coast, Sydney Basin and South East Corner bioregions.	Subject Lands occurs approx. 30m to 40m above sea-level (ASL)
The structure of the community is typically open forest, although partial clearing may have reduced the canopy to scattered trees. In some areas the tree stratum is low and dense, so that the community takes on the structure of scrub. The community also includes some areas of fernland and tall reedland or sedgeland, where trees are very sparse or absent. Typically, these forests, scrubs, fernlands, reedlands and sedgelands form mosaics with other floodplain forest communities and treeless wetlands, and often they fringe treeless floodplain lagoons or wetlands with semi-permanent standing water.	PCT 4023 occurs in a poor condition resulting in the both forest and scrubs variant of the community being present.
The composition of <i>Swamp Sclerophyll Forest on Coastal Floodplains</i> is primarily determined by the frequency and duration of waterlogging and the texture, salinity nutrient and moisture content of the soil. Composition also varies with latitude.	AEP have undertaken surveys within the Subject Lands and mapped PCT 4023 in 2024 during high rainfall events. During these events the soils were holding surface water showing waterlogged features. Hence the community structure and complexities in the soils reflect these conditions. At present the soils match the description for the community.
EEC specific assemblage of species: • <i>Acacia irrorata</i> • <i>Acacia longifolia</i> • <i>Acmena smithii</i> • <i>Adiantum aethiopicum</i> • <i>Allocasuarina littoralis</i> • <i>Banksia oblongifolia</i> • <i>Banksia spinulosa</i>	Upper Stratum: <i>Casuarina glauca</i> Mid Stratum: Absent Lower Stratum: No listed species present

Characteristics	Assessment of Vegetation Community – Subject Site
• <i>Baumea articulata</i> • <i>Baumea juncea</i> • <i>Blechnum camfieldii</i> • <i>Blechnum indicum</i> • <i>Breynia oblongifolia</i> • <i>Callistemon salignus</i> • <i>Calochlaena dubia</i> • <i>Carex appressa</i> • <i>Casuarina glauca</i> • <i>Centella asiatica</i> • <i>Dianella caerulea</i> • <i>Dodonaea triquetra</i> • <i>Elaeocarpus reticulatus</i> • <i>Entolasia marginata</i> • <i>Entolasia stricta</i> • <i>Eucalyptus botryoides</i> • <i>Eucalyptus longifolia</i> • <i>Eucalyptus resinifera</i> subsp. <i>hemilampra</i> • <i>Eucalyptus robusta</i> • <i>Ficus coronata</i> • <i>Gahnia clarkei</i> • <i>Gahnia sieberiana</i> • <i>Glochidion ferdinandi</i> • <i>Glycine clandestina</i> • <i>Gonocarpus tetragynus</i> • <i>Hydrocotyle peduncularis</i> • <i>Hypolepis muelleri</i> • <i>Imperata cylindrica</i> var. <i>major</i> • <i>Isachne globosa</i> • <i>Leptospermum polygalifolium</i> subsp. <i>polygalifolium</i> • <i>Livistona australis</i> • <i>Lomandra longifolia</i> • <i>Lophostemon suaveolens</i> • <i>Melaleuca ericifolia</i> • <i>Melaleuca linariifolia</i> • <i>Melaleuca quinquenervia</i> • <i>Melaleuca sieberi</i> • <i>Melaleuca styphelioides</i> • <i>Morinda jasminoides</i> • <i>Homalanthus populifolius</i> • <i>Oplismenus aemulus</i> • <i>Oplismenus imbecillis</i>	

Characteristics	Assessment of Vegetation Community – Subject Site
• <i>Parsonsia straminea</i> • <i>Phragmites australis</i> • <i>Polyscias sambucifolia</i> • <i>Pratia purpurascens</i> • <i>Pteridium esculentum</i> • <i>Stephania japonica</i> var. <i>discolor</i> • <i>Themeda australis</i> • <i>Villarsia exaltata</i> • <i>Viola banksii</i> • <i>Viola hederacea</i>	
This EEC is known from parts of the Local Government Areas of Tweed, Byron, Lismore, Ballina, Richmond Valley, Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Hastings, Greater Taree, Great Lakes and Port Stephens, Lake Macquarie, Wyong, Gosford, Hornsby, Pittwater, Warringah, Manly, Liverpool, Rockdale, Botany Bay, Randwick, Sutherland, Wollongong, Shellharbour, Kiama and Shoalhaven but may occur elsewhere in these bioregions. Major examples once occurred on the floodplains of the Tweed, Richmond, Clarence, Macleay, Hastings and Manning Rivers, although smaller floodplains would have also supported considerable areas of this community.	The Subject Lands is located within the Maitland City Council LGA which is not listed, however the community is known for being previously known in the LGA.
Small areas of this EEC are contained within existing conservation reserves, including Bungawalbin, Tuckean and Moonee Beach Nature Reserves, and Hat Head, Crowdy Bay, Wallingat, Myall Lakes and Garigal National Parks. These occurrences are unevenly distributed throughout the range and unlikely to represent the full diversity of the community.	Not applicable.
This EEC forms part of a complex of forested and treeless wetland communities found throughout the coastal floodplains of NSW. The combination of features that distinguish <i>Swamp Sclerophyll Forest on Coastal Floodplains</i> from other EECs on the coastal floodplains include: • Its relatively dense tree canopy dominated by <i>Eucalyptus robusta</i>, <i>Melaleuca quinquenervia</i> or <i>E. botryoides</i>, the relatively infrequent occurrence of other eucalypts, <i>Casuarina glauca</i> or <i>Lophostemon suaveolens</i>; • The occasional presence of rainforest elements as scattered trees or understorey plants; and • The prominence of large sedges and ferns in the groundcover.	The vegetation formation identified within the Subject Lands is forested wetland located within the floodplain of an unnamed watercourse. The areas where tree canopy is absent and where the groundcovers species area consistent with species within heavily grazed pastures.
It generally occupies small alluvial flats and peripheral parts of floodplains where they adjoin lithic substrates or coastal sandplains. The soils are usually waterlogged, stained black or dark grey with humus, and show little influence of saline ground water.	PCT 4023 occupies two (2) small patches in a vacant alluvial flat within the Subject Lands and surrounding.

Characteristics	Assessment of Vegetation Community – Subject Site
<i>Swamp Sclerophyll Forest on Coastal Floodplains</i> includes and replaces <i>Sydney Coastal Estuary Swamp Forest in the Sydney Basin bioregion</i>. It may adjoin or intergrade with several other EECs, which collectively cover all remaining native vegetation on the coastal floodplains of New South Wales. These include: • <i>Lowland Rainforest on Floodplain in the NSW North Coast bioregion</i>; • <i>River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i> (including the formerly listed <i>Sydney Coastal River-Flat Forest in the Sydney Basin bioregion</i>); • <i>Subtropical Floodplain Forest, Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>; and • <i>Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>. For example, as soils become less waterlogged, this EEC may adjoin or intergrade with <i>River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>. As soil salinity increases it may intergrade with, and be replaced by, <i>Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>. The boundaries between these communities are dynamic and may shift in response to changes in hydrological regimes, fire regimes or land management practices. The Determinations for these communities collectively encompass the full range of intermediate assemblages in transitional habitats.	
Is the PCT associated with this EEC (Yes or No)?	No
Is the PCT EPBC listed under a different CEEC or EEC name (Yes or No)?	No
Detailed Justification of Assessment: The community within the Subject Land has had varying levels of disturbance over time resulting in a fragmented remnant community with varying composition, structure and function. However, for the vegetation conditions at the time of survey, Poor, do not align with all key indicators, limited to one listed species. Therefore, PCT 4023 within the Subject Land is a Severely Degraded <i>Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions</i>.	
Referral Requirements: EPBC Act Listing Status: Not Listed Action: There is no EPBC Act listed TEC associated with the above community. No further assessment was therefore required.	

4.2.6.3 Alignment with EPBC Act listed TECs

PCT 4023 is associated with the EPBC Act listed Endangered Ecological Community (EEC) *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community* under the BioNet Vegetation Classification. **Table 12** shows the EPBC list communities and assessment against PCT 4023, showing the isolation of the patch within the surrounding lands, the limited species presence and the lack of saline / brackish parameters within the Subject Lands demonstrate PCT 4023 is not associated *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community*.

Table 12: PCT 4023 Assessment of Association with EPBC Act listed Endangered Ecological Community

EEC	Status	Association with PCT 3433 (Y / N)	Key Diagnostic	Assessment
<i>Central Hunter Valley eucalypt forest and woodland</i>	Critically Endangered	N	N/A	N/A
<i>Kurri sand swamp woodland of the Sydney Basin bioregion</i>	Endangered	N	N/A	N/A
<i>White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland</i>	Critically Endangered	N	N/A	N/A
<i>Hunter Valley Weeping Myall (Acacia pendula) Woodland</i>	Critically Endangered	N	N/A	N/A
<i>River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria</i>	Critically Endangered	N	N/A	N/A
<i>Lowland Rainforest of Subtropical Australia</i>	Critically Endangered	N	N/A	N/A
<i>Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland</i>	Endangered	N	N/A	N/A
<i>Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East</i>	Endangered	Y	Occurs from south-east Queensland to southern NSW within the South Eastern Queensland, NSW North Coast, Sydney Basin, or South East Corner bioregions	Yes

EEC	Status	Association with PCT 3433 (Y / N)	Key Diagnostic	Assessment
Queensland ecological community			Occurs in coastal catchments at elevations up to 50 m ASL, typically less than 20 m ASL, on coastal flats, floodplains, drainage lines, lake margins, wetlands and estuarine fringes where soils are at least occasionally saturated, water-logged or inundated. There are also minor occurrences on coastal dune swales or flats, particularly deflated dunes and dune soaks.	Subject Lands occurs approx. 30m to 40m above sea-level (ASL)
			Occurs on soils derived from unconsolidated sediments (including alluvium), typically hydrosols (grey-black clay-loam and/or sandy loam soils) and sometimes organosols (peaty soils). It may occur in transitional soils (or catenas) where shallow unconsolidated sediments border lithic substrates.	Subject Lands has sandy loam soils.
			Has an open woodland, woodland, forest, or closed forest structure, with a tree canopy that has a total crown cover of at least 10 per cent.	The patch has a coverage if over 10% canopy coverage.
			Has a canopy of trees dominated by Casuarina glauca (swamp-oak, swamp she-oak).	Yes
			Typically occurs where groundwater is saline or brackish	No
			Typically occurs within 30km of the coast, but in some areas, such as along tidal river catchments, the ecological community can occur more than 100km inland.	Located approx. 55km from coast.
			Does not occur on rocky headlands, sea cliffs or other consolidated sediments.	No
			- Large patch The patch is at least 5ha. - Medium patch. The patch is at least 2ha and less than 5ha. - Small contiguous patch. The patch is at least 0.5ha and less than 2ha, and is connected to	Patch size is less than 0.5ha = 0.11ha

EEC	Status	Association with PCT 3433 (Y / N)	Key Diagnostic	Assessment
			a larger area of native vegetation of at least 5ha. Small patch. The patch is at least 0.5 ha and less than 2ha.	
			- HIGH QUALITY Predominantly native understorey Non-native species comprise less than 20% of total understorey vegetation cover* - GOOD QUALITY Mostly native understorey Non-native species comprise less than 50% of total understorey vegetation cover* AND transformer species*** comprise less than 30% of total understorey vegetation cover* - MODERATE QUALITY Some native understorey Non-native species comprise less than 80% of total understorey vegetation cover* AND transformer species*** comprise less than 50% of total understorey vegetation cover*	Moderate quality
			Surrounding environment, landscape context and significance considerations - Patches of the ecological community do not occur in isolation.	The patch is isolated within Subject Lands and Surrounding lands.

4.2.7 Planted Native – *Cynodon dactylon*

This planted species occurs in abundance across the Subject site, proliferating throughout BAM Plots 3, 4 and 5. Refer to **Section 4.1.2** for comprehensive analysis of this species.



Plate 5: Planted Native - *Cynodon dactylon* BAM Plot 3 Start



Plate 6: Planted Native – *Cynodon dactylon* BAM Plot 4 Start



Plate 7: Planted Native - *Cynodon dactylon* BAM Plot 5 Start

4.3 Threatened Ecological Communities

No TECs were identified on site as described and justified in **Section 4.2**. No further consideration under the BC Act or EPBC Act is required.

4.4 Vegetation zones

Table 13 provides a summary of Vegetation Zones and associated areas identified throughout the Subject Lands and Study Area. **Table 14** describes how patch size classes were identified and how the assessment address Table 3 in BAM 2020.

Table 13: Summary of Vegetation Zones Areas

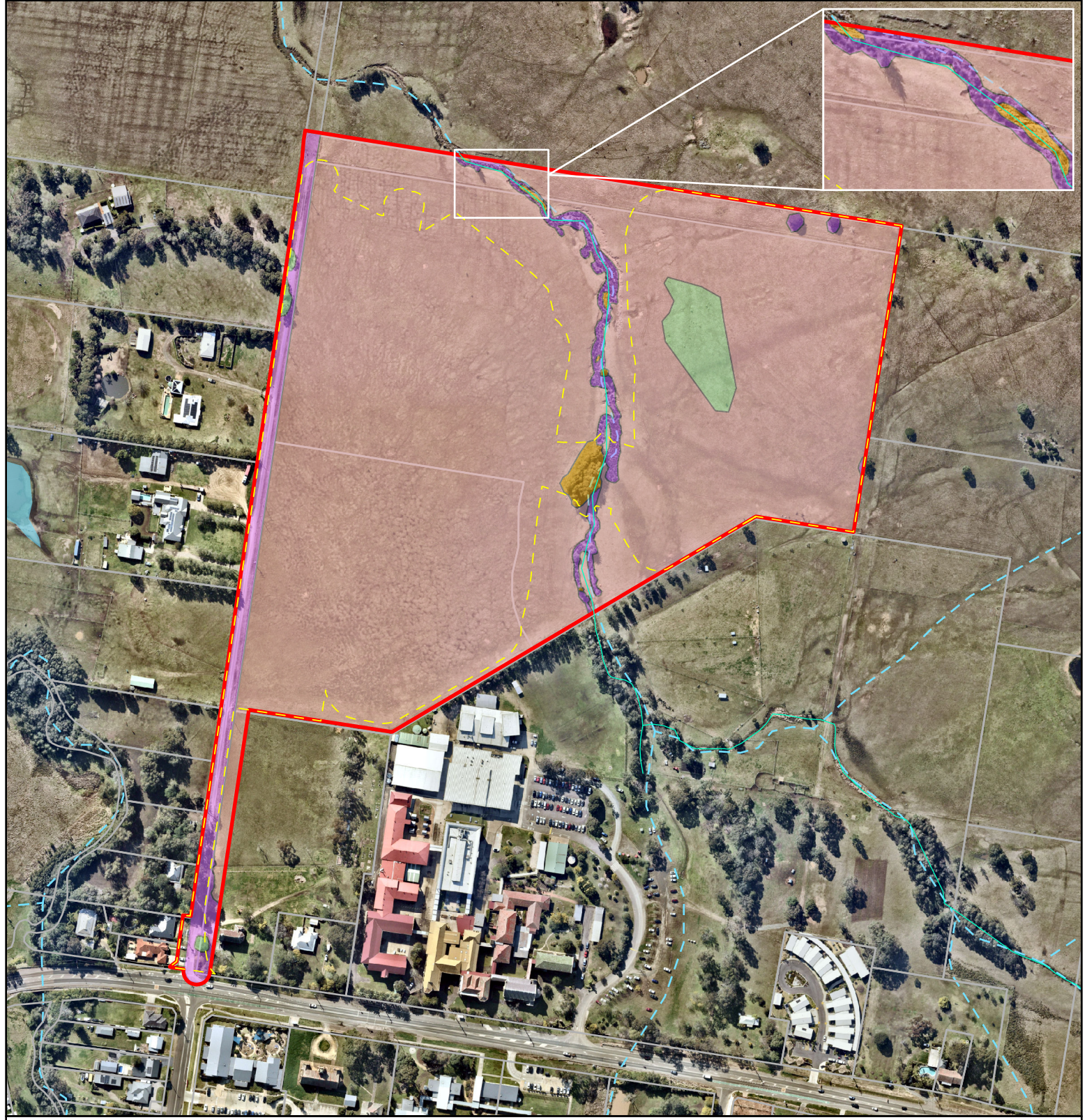
Zone	Vegetation Community	Condition	Total Subject Lands / Area of Impact (ha)	Regeneration (BMP Lands) (ha)
1	PCT 4023	Poor	0.11	2.33
2	PCT 3433	Severely Degraded	0.39	-
Total Native Vegetation (ha)			0.50	2.33
Planted-native			15	-
Cleared / infrastructure			1.15	-
Total (ha)			16.65	
Total Study area (ha)			16.65	2.33

**Discrepancies in numbers are due to rounding.*

Table 14: Vegetation zones and patch size

Vegetation zone ID	PCT ID number and name	Condition / other defining feature	Area (ha) on Subject Land	Patch size class (list multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
Severely Degraded	PCT 3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Severely Degraded	0.39	>10–30%	1	1	1	Plot 2
Poor	PCT 4023 - Coastal Valleys Riparian Forest	Poor	0.11	>10–30%	1	2	2	Plots 1 and 6
Planted Native	Non-endemic Planted Native – <i>Cynodon dactylon</i>	Planted Native	15	>10–30%	3	3	3	Plots 3, 4 and 5

The extent of each PCT is provided in **Figure 4**.



Legend

- Study Area

Development Footprint

Cadastre

HydroArea
- Ground Truthed Vegetation

Non-Native

PCT 3433
- PCT 4023

Planted Native Module (Cynodon dactylon)
- Ground Truthed Stream Order

NSW Hydroline

Address: 20 & 20A Cantwell Rd and 60 New England Hwy, Lochinvar NSW
Client: Trustee RCC Diocese M N | AEP Ref: 4951 | Date: January 2025

Imagery: NearMap, downloaded 8/8/2024
Spatial Reference: GDA2020 MGA Zone 56

0 40 80 m

Scale: 1:4,000

N

W

S

E

Figure 4 - Ground Truthed Vegetation



Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan

4.5 Vegetation integrity (vegetation condition)

The Plant Communities Types within the Subject Lands have been established through the analysis of data collected. The categories and application of the data using other section within the BAM 2020, such as the Planted Native Module. The following assessment and development of vegetation zones have been carried out through the modification of methods used to establish PCT and the vegetation zones are described below.

AEP botanist recorded vegetation zones and conditions when the BAM Plots were undertaken, this information was used to assist with the development of the Vegetation Zones within the identified Plant Communities Types. The BAM Plot data was entered independently into the BAM C, where the application of the of the vegetation conditions were allocated. AEP uses the continuous non-linear approach based on the Weibull function, as outlined in State of NSW and Office of Environment and Heritage, 2017, *Native Vegetation Integrity Benchmarks*, where conditions are allocated based on 0 being lowest and 100 being the highest of benchmark respectively, allowing the below conditions to be allocated to each BAM Plot individually (refer **Appendix F**):

- 70 – 100 Good;
- 50 – 69 Moderate;
- 35 – 49 Poor;
- 25 - 34 Degraded;
- 17 - 24 Highly Degraded; and
- < 17 Severely Degraded.

The individual BAM Plot VIS were assessed allowing the vegetation zones within the above condition classes to be grouped together and entered into the BAM – C for further assessment.

4.5.1 Vegetation integrity survey plots

The minimum number of plots required for each vegetation zone were met in accordance with the BAM. Vegetation plots undertaken in the wider Study Area and outside Subject Land have been excluded from the assessment as they do not represent vegetation impacted by the proposal. Findings from these assessments are still considered when discussing 'Avoid and Minimise' principles and associations with ecological communities.

4.5.2 Scores

Vegetation scores as assessed within the Subject Land are provided in **Table 15** below.

Table 15: Vegetation integrity scores

Site Attribute	PCT 3433	PCT 4023	
Plot #	2	2	6
Location	355549E 6381545N	355455E 6381410N	355409E 6381641N
Bearing	170	14	121
Tree	0	1	0
Shrub	1	0	0
Grass & Grass-like	6	3	6
Forb	0	6	4
Fern	0	0	0
Other	0	0	0

Site Attribute	PCT 3433	PCT 4023	
Plot #	2	2	6
Composition Condition Score	16.3	35.4	
Tree	1	70	0
Shrub	1	0	0
Grass & Grass-like	16	2.3	67.5
Forb	12	0.7	0.8
Fern	0	0	0
Other	0	0	0
Structure Condition Score	10.1	54.3	
Regenerating Stems (<5cm DBH)	0	Present	Absent
Stem Classes (cm DBH)	0	5-9, 10-19, 20-29	0
# Large Trees	0	1	0
Hollow-bearing Trees	0	1	0
Litter Cover (%)	7	16	43.4
Coarse Woody Debris (m)	0	0	0
High Threat Weed Cover	51.5	24.4	30.3
Function Condition Score	0.3	48.5	
Current Vegetation Integrity Score	5.5	45.3	

4.5.3 Use of benchmark data

Benchmark data was sourced from the NSW BioNet Vegetation Classification system for PCT 3433 and PCT 4023.

5.0 Habitat Suitability for Threatened Species

5.1 Identification of threatened species for assessment

5.1.1 Ecosystem credit species

As detailed in **Sections 2.3** and **2.4**, both desktop and habitat assessments were undertaken to identify the potential use of the Subject Land by threatened fauna. A total of 42 ecosystem or dual credit species were identified for further assessment, as described in **Table 16**.

Table 16: Predicted ecosystem credit species

Scientific name	Common name	Listing status		Dual credit species	Source (BAM-C, TBDC, Previous Survey, Current Survey)	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Artamus cyanopterus</i>	Dusky Woodswallow	V	-	No	BAM-C	Yes	N/A	4023-Coastal Valleys Riparian Forest	Moderate
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Moderate

Scientific name	Common name	Listing status		Dual credit species	Source (BAM-C, TBDC, Previous Survey, Current Survey)	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE	Yes	BAM-C	Yes	N/A	4023-Coastal Forest Valleys Riparian	High
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	E	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate
<i>Calyptorhynchus lathami</i>	South-eastern Glossy Black-Cockatoo	V	V	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Chthonicola sagittata</i>	Speckled Warbler	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Circus assimilis</i>	Spotted Harrier	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate

Scientific name	Common name	Listing status		Dual credit species	Source (BAM-C, TBDC, Previous Survey, Current Survey)	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	V	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate
<i>Falco subniger</i>	Black Falcon	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate

Scientific name	Common name	Listing status		Dual credit species	Source (BAM-C, TBDC, Previous Survey, Current Survey)	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	High
<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	-	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	V	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High

Scientific name	Common name	Listing status		Dual credit species	Source (BAM-C, TBDC, Previous Survey, Current Survey)	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
<i>Irediparra gallinacea</i>	Comb-crested Jacana	V	-	No	BAM-C	Yes	N/A	4023-Coastal Valleys Riparian Forest	Moderate
<i>Ixobrychus flavicollis</i>	Black Bittern	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Moderate
<i>Lathamus discolor</i>	Swift Parrot	E	CE	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	V	-	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	High
<i>Limosa limosa</i>	Black-tailed Godwit	V	E	Yes	BAM-C	Yes	N/A	4023-Coastal Valleys Riparian Forest	High

Scientific name	Common name	Listing status		Dual credit species	Source (BAM-C, TBDC, Previous Survey, Current Survey)	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate
<i>Melithreptus gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Moderate
<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	-	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High

Scientific name	Common name	Listing status		Dual credit species	Source (BAM-C, TBDC, Previous Survey, Current Survey)	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
<i>Neophema pulchella</i>	Turquoise Parrot	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	High
<i>Pandion cristatus</i>	Eastern Osprey	V	-	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate
<i>Petaurus australis</i>	Yellow-bellied Glider	V	V	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	High
<i>Petroica boodang</i>	Scarlet Robin	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate

Scientific name	Common name	Listing status		Dual credit species	Source (BAM-C, TBDC, Previous Survey, Current Survey)	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
<i>Petroica phoenicea</i>	Flame Robin	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Moderate
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	-	V	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	High
<i>Pteropus poliocephalus</i>	Grey-headed Flyingfox	V	V	Yes	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	No	BAM-C	Yes	N/A	4023-Coastal Valleys Riparian Forest	Moderate

Scientific name	Common name	Listing status		Dual credit species	Source (BAM-C, TBDC, Previous Survey, Current Survey)	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	High
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	High
<i>Stagonopleura guttata</i>	Diamond Firetail	V	V	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate
<i>Tyto longimembris</i>	Eastern Grass Owl	V	-	No	BAM-C	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest	Moderate

5.1.2 Survey Effort

The survey methods above were utilised across the Study Area commencing in May 2024 to July 2024. Surveys conducted within the Subject Lands are highlighted. **Table 17** outlines a summary of field surveys, refer **Figure 5**.

Table 17: Field Survey Periods

Date	Time	Hours	Field activity	No. of Persons on Site	Staff	Rainfall
23/05/2024	7:00 – 15:00	8	General site, Habitat Assessment and SAT	3	YB, KB, OS	0mm
			Hollow-bearing Tree Transects.			
			BAM Plots			
			20m Flora Transects: <i>Eucalyptus pumila</i>			
			Incidental: Diurnal Bird Surveys, incidental fauna and flora			
24/06/2024	9:15 – 14:00	5:45	BAM Plots Additional Tree Assessment.	1	BD	0mm

5.1.3 Habitat Assessment

5.1.3.1 Habitat Trees

One (1) hollow bearing tree (HBTs) with an extra small hollow (less than 5cm diameter) was identified in the Subject Lands near the New England Highway. Given the lack of connectivity and proximity to the New England Highway it has been determined that the hollow is not likely to be used by the listed species within the region. Therefore, the removal of the hollow will not have an adverse impact on biodiversity values within Lochinvar area.

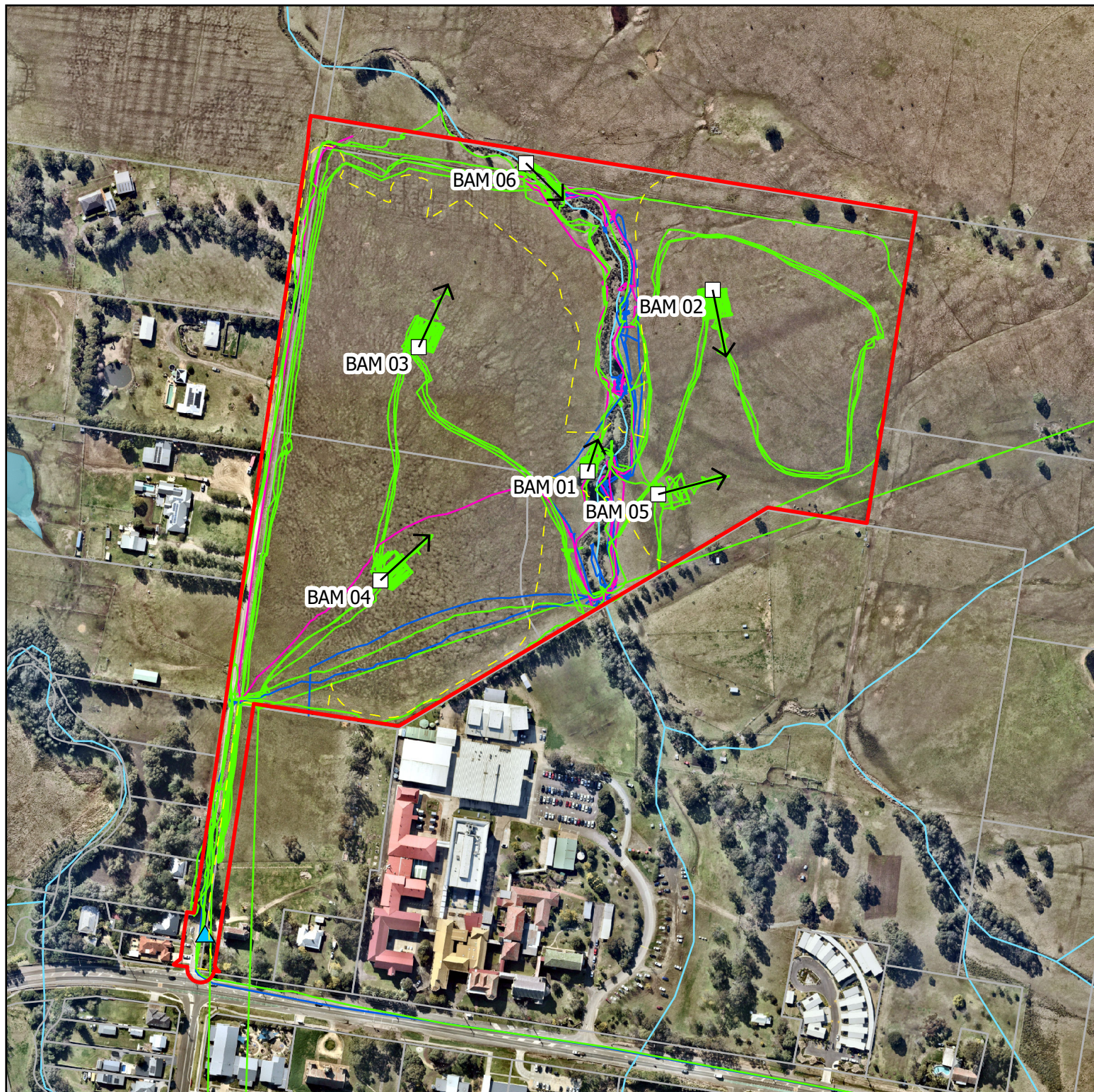
5.1.3.2 Water Features and Hydrology

No underground sources of water or aquifers feeding streams occur on the Subject Lands that would likely be affected by the Project. Above ground sources of water within the Subject Lands include a mapped hydroline. The unnamed stream is located through the centre of the property and has limited to native vegetation, severe erosion and blockages to fish passage. The proposal includes the removal of the two (2) blockages to fish passage, the installation of one (1) fish friendly road crossing and the installation of a vegetated rehabilitation batter. The proposed development triggers *Section 91* of the *Water Management Act, 2000* (WM Act) requiring a Controlled Activities Approval is required. These works also trigger *Section 201* and *219* of the *Fisheries Management Act, 1994*, requiring permits.

Refer to AEP (2025) WLAR, AER (2025) and BMP (2025) for aquatic assessment, permits and regeneration of these lands.

5.1.3.3 Other Habitat Features

The Subject Lands possesses additional habitat features, this includes piles of vegetation debris in the creek, however the paddock is clear of piles of logs and fallen trees. No caves, karsts or rocky outcrops occurred on site and are considered a habitat constraint for cave-dwelling microbats. No artificial structures are in the Subject Site.



Legend

Study Area	Survey Effort	Hollow Bearing Tree
Development Footprint	BAM Plot and Vegetation Assessment	BAM Plot
Cadastre	Riparian Assessment (RAR)	BAM Transect
HydroArea	Aquatic Assessment	
NSW Hydroline		

Address: 20 & 20A Cantwell Rd and 60 New England Hwy, Lochinvar NSW
Client: Trustee RCC Diocese M N | AEP Ref: 4951 | Date: January 2025

Imagery: NearMap, downloaded 8/8/2024
Spatial Reference: GDA2020 MGA Zone 56

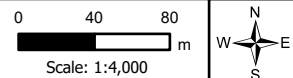


Figure 5 - Survey Effort



Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan

5.1.4 Species credit species

A total of two (2) flora species was returned by the BAM-C for assessment. No threatened entities have been recorded within the 1500m assessment area through BioNet, likely due to the heavily modified agricultural habitat within surrounding lands that limits potential use by threatened species as well as limited targeted threatened species searches occurring within the locality.

Table 18: Predicted species credit species

Scientific Name	Common Name	Listing status		Source (BAM-C, TBDC, Previous Survey, Current Survey)	Paddock Trees Use	Species retained for further assessment?	Reason for exclusion	Vegetation zone ID species retained in
		BC Act	EPBC Act					
Flora								
<i>Eucalyptus pumila</i>	Pokolbin Mallee	V	V	BAM-C	No	Yes	N/A	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest and 4023-Coastal Valleys Riparian Forest
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	V	V	BAM-C	No	No	Section 5.2.2 (2b) of BAM 2020, Habitat Constraints.	N/A
<i>Calidris ferruginea</i>	Curlew Sandpiper	V	V	BAM-C	No	No	Section 5.2.2 (2b) of BAM 2020, Habitat Constraints.	N/A
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	V	V	BAM-C	No	No	Section 5.2.2 (2b) of BAM 2020, Habitat Constraints.	N/A
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V	V	BAM-C	No	No	Section 5.2.2 (2b) of BAM 2020, Habitat Constraints.	N/A
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	BAM-C	No	No	Section 5.2.2 (2b) of BAM 2020, Habitat Constraints.	N/A

Scientific Name	Common Name	Listing status		Source (BAM-C, TBDC, Previous Survey, Current Survey)	Paddock Trees Use	Species retained for further assessment?	Reason for exclusion	Vegetation zone ID species retained in
		BC Act	EPBC Act					
<i>Miniopterus australis</i>	Little Bent-winged Bat	V	V	BAM-C	No	No	Section 5.2.2 (2b) of BAM 2020, Habitat Constraints.	N/A
<i>Anthochaera phrygia</i>	Regent Honeyeater	V	V	BAM-C	No	No	Section 5.2.2 (2a) of BAM 2020, Habitat Constraints - not map as per Important Habitat Map	N/A
<i>Tyto tenebricosa</i>	Sooty Owl	V	V	BAM-C	No	No	Section 5.2.2 (2a) of BAM 2020, Habitat Constraints.	N/A
<i>Lathamus discolor</i>	Swift Parrot	V	V	BAM-C	No	No	Habitat Constraints - not map as per Important Habitat Map	N/A

5.2 Presence of candidate species credit species

From the remaining list of candidate species credit species, no threatened species were determined to be present within the Subject Land. AEP used TDBC and BioNet records to determine if additional species should be assessed as a result of records within Study Area or surrounding areas. The results show no species recorded within the Subject Site, refer **Figure 6**.

5.3 Threatened species surveys

Targeted threatened species surveys were conducted in June 2024 during which no threatened species were found to be present within the Subject Land. The survey methodology was undertaken as per **Table 19**.

Table 19: Threatened species surveys for candidate flora species on the Subject Land

Table 19: Threatened species surveys for candidate flora species on the Subject Land							
Scientific name	Common name	Threatened flora species surveys			Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)	
		Survey method	Timing of survey – within recommended period?				Effort (hours & no. people)
<i>Pokolbin Mallee</i>	<i>Eucalyptus pumila</i>	Transects of non-grassland vegetation	☒ Yes	☐ No	1 Person 4 hours	No	No

Additional details on the survey requirements for each species are provided below.

Pokolbin Mallee

The prescribed survey period for this species is all year 20m - transects, easily identifiable (TDBC). A mallee-form eucalypt to 6 m high with smooth bark that sheds completely from stems in strips; bark coppery in colour, but weathering to greyish. Juvenile leaves are ovate, up to 12 cm long and 6 cm wide. Adult leaves are lanceolate to falcate, up to 16 cm long and 2.5 cm wide, glossy green both sides. Inflorescences (groups of flowers, buds or fruits) form in angle between the stem and leaf and are 7-flowered. Buds are stalked, up to 12 mm long and 9 mm in diameter. Flowers are white. Fruit are hemispherical, with a short stalk, 6 – 7 mm long and 7 – 9 mm in diameter, with four exerted valves.

The species is currently known only from a single population west of Pokolbin in the Hunter Valley. Historical records also exist for Wyong and Sandy Hollow, however, has not been recorded recently in these areas.

It generally is present as a mid-canopy species to a height of 6 m within dry sclerophyll woodland which has a canopy comprising *Eucalyptus fibrosa*, *Callitris endlicheri* and, to a lesser extent, *Corymbia maculata*.

5.4 Expert Reports

No expert reports have been used in place of threatened species surveys.

5.5 Area or count, and location of suitable habitat for a species credit species

No threatened species were identified within the Subject Land.



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Legend

- | | | | | |
|------------------------------------|-------------------------|--------------------------------|---------------------------|--|
| Study Area | Development Footprint | Tyto novaehollandiae | Flora | Eucalyptus parramattensis subsp. decandens |
| Cadastre | 1500m Assessment Buffer | Mammalia | Acacia bynoeana | Grevillea parviflora subsp. parviflora |
| Bionet Atlas Records | | Miniopterus orianae oceanensis | Callistemon linearifolius | Rutidosis heterogama |
| Aves | | Phascogale tapoatafa | Eucalyptus camaldulensis | Syzygium paniculatum |
| Glossopsitta pusilla | | Pteropus poliocephalus | Eucalyptus glaucina | |
| Lophoictinia isura | | Saccolaimus flaviventris | | |
| Pomatostomus temporalis temporalis | | Scoteanax rueppellii | | |

Address: 20 & 20A Cantwell Rd and 60 New England Hwy, Lochinvar NSW
Client: Trustee RCC Diocese M N | AEP Ref: 4951 | Date: January 2025

Imagery: SixMaps
Spatial Reference: GDA2020 MGA Zone 56

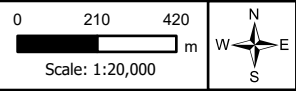


Figure 6 - BioNet Atlas Records



Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan

6.0 Identifying Prescribed Impacts

Prescribed impacts are defined in clause 6.1 of the *Biodiversity Conservation Regulation 2017*, and are additional impacts on threatened species that need to be considered and assessed when a development is proposed. These can include loss of habitat, fragmentation, and other indirect impacts which may affect threatened species.

Table 20: Prescribed impacts identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature.
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐ Yes / ☒ No	N/A	N/A
Human-made structures	☐ Yes / ☒ No	N/A	An aquatic habitat survey was undertaken as part of the AER (AEP 2025a) to inform potential impacts. The assessment found that the proposed crossing will have a direct impact during construction, and provide recommendations to ensure no blockage of fish habitat during construction. Recommendations are provided in the AER to mitigate potential risks to this feature.
Non-native vegetation	☒ Yes / ☐ No	The majority of the site is grazed exotic grassland.	Refer assessment in planted native Section 4.1.2
Habitat connectivity	☐ Yes / ☒ No	Due to extensive agricultural practices within the wider area, habitat connectivity within the wider landscape is very poor.	No threatened entities were identified utilising this corridor, and due to the isolated nature of the vegetation and highly degraded conditions, likely, it would only be used intermittently by more mobile species.
Waterbodies, water quality and hydrological processes	☒ Yes / ☐ No	The watercourse that runs through the Subject Lands will be impacted	No threatened entities were identified utilising these features.
Wind turbine strikes (wind farm development only)	☐ Yes / ☒ No	N/A	N/A
Vehicle strikes	☐ Yes / ☒ No	N/A	N/A

Stage 2 Impact assessment (biodiversity values and prescribed impacts)

7.0 Avoid and minimise impacts

7.1 Avoid and minimise direct and indirect impacts

7.1.1 Project location direct and indirect impacts

The project location is the result of a carefully considered and iterative design process that prioritises the avoidance of impacts on areas of high biodiversity value. Engaged in May 2024, AEP conducted a site assessment to identify assess areas of biodiversity value, leading to the identification of several key ecological features.

Among these is the limited native vegetation in the form of canopy only communities or groundcover only communities due to the severe degradation of the Subject Lands through past clearing and agricultural activities.

Additionally, the project identified and assessed watercourses and riparian areas within the Study Area. To avoid impacts, the development was located outside vegetated riparian zones, with the exception of necessary upgrades to the riparian area due to severe erosion and human made blockages to fish passage. The unnamed creek was assessed to determine its current condition, with mitigation measures proposed for construction impacts and strategies to enhance ecological outcomes post-construction. Re-vegetation efforts, as detailed in the BMP, are aimed at improving the condition of riparian areas following development.

AEP reviewed aerial imagery of the Subject Lands which shows the Subject Lands being clear of vegetation between 1929 and 1938. The removal of vegetation and grazing on this land has led to top soil loss and significant loss of natives within the seed banks. These land use practices have also had a serve impact on the health of the Hunter River Catchment, through installation of blockages to fish passage, cattle accessing the creek for water and to crossings has eroded the banks and bed.

AEP preliminary investigations in May showed a highly degraded site with limited to no Biodiversity Value.



Plate 7: Historical Aerial Imaginary 1929 -1938 (specific date not provided) DFSI, (2018).

7.1.2 Project Design direct and indirect impacts

AEP as engaged in May 2024 to prepare both aquatic and terrestrial ecological assessment for residential subdivision in the Subject Site. As detailed in **Section 7.1.1**, the project location has limited to no Biodiversity value with a couple of non-connected patches of native vegetation, with the dominant vegetation being a planted pasture grass that provides limited to no foraging opportunities or habitat for any listed species within the local area or broader region.

The constraints maps prepared by AEP highlighting the Subject Lands had limited to no areas of biodiversity value, even though limited these were clearly presented to the design team and client. This assessment led to a minimum of 20m (either side) Vegetated Riparian Zones (VRZs) being proposed for the degraded system (using the merit-based assessment). This requirement reduced the encroachment into waterfront land.

Hence it has been determined that the proposed works will provide a Nature Positive outcome through the proposed regeneration activities, including the re-vegetation of the riparian areas, provide a habitat connectivity, improve vegetation quality, and contribute to an overall increase in biodiversity values and restore the unnamed creek as outlined in **Section 7.2.1**.

7.2 Avoid and minimise prescribed impacts

7.2.1 Project Location

As outlined in **Section 7.1.1**, and **7.1.2** the proposed development has been strategically located to avoid impacts on sensitive environmental features.

The Subject Lands has been selected due the highly degraded nature, limited connectivity and limited ability to regenerate.

To protect water bodies and maintain hydrological integrity, the development avoided riparian lands. The upgrade of the unnamed creek was informed by aquatic assessment, which deemed the location of the existing crossing as the area most suitable for development.

Habitat connectivity in the wider landscape offers limited opportunity for fauna dispersal. The remaining connectivity is mostly confined to riparian corridors, including unnamed creek, although it has been cleared in many sections. To address this, the project avoided development in riparian zones where practical, particularly in the northeast of the site.

7.2.2 Project Design

AEP was engaged in May 2024 to prepare both aquatic and terrestrial ecological assessment for residential subdivision in the Subject Site. The Subject Lands has limited prescribe features, with the unnamed creek being the main feature that is not considered native, with no caves, karst, etc. The concept plans proposed a 10m buffer off the unnamed watercourse with 5m either side regeneration. AEPs aquatic and terrestrial ecologists undertook a site survey to determine ecological constraints in May, June 2024.

Further assessment and reporting was prepared by AEPs Aquatic Ecologists for the unnamed creek, with regards to health of the watercourse. This raised additional issues with the Subject Site, being the bed and bank erosion and blockage to fish passage, these issues required AEPs aquatic team to propose reconstruction / stabilisation of the creek to reduce / improve the water quality, flows and aquatic habitat.

AEP Waterfront Land Assessment and Aquatic Ecology Assessment showed this unnamed creek in a state of severe decline, it identified two blockages to fish passage, a highly turbid water column, high weed loads, and limited habitat (refer **Plate 8**). AEP meet with the GCA Engineering Solutions to determine if the blockages were able to be removed from the unnamed creek without creating further erosion of the banks and bed. GCA Engineering Solutions, modelled the system with these obstructions removed and the proposed Fish Friendly box culvert installed and determined that there should be minimal change in bed and banks.



Plate 8: Crossing blocking fish passage (AEP 2024).

When analysing the Waterfront Land and aquatic data collected AEP reach out to the client and lead engineer from GCA Engineering Solutions to undertake a site inspection in November 2024 to assess the bed and bank erosion within the north of the unnamed creek (refer Plate 9). The assessment of this area and historical photos of the site show that erosion is increasing on the eastern bank and there is also bed erosion running in a formed channel east of the creeks natural alignment.

During the inspection with the Engineer, it was determined that vegetation alone was not going to stabilise this erosion. GCA Engineering Solutions, prepared two options: gabion wall with fill behind or a battered mound filling behind.

AEP regeneration team reviewed both options and determined the battered mound was the preferred option as it would not create a hard surface and would allow for bank planting, providing more habitat while stabilising this section of the unnamed creek.



Plate 9: Bank Erosion (AEP 2024).

7.2.2.1 Biodiversity Management Plan

A Biodiversity Management Plan (BMP) has been incorporated with a focus on restoring riparian areas and enhancing habitat connectivity along the unnamed creek. The BMP outlines targeted re-vegetation and creek regeneration efforts designed to:

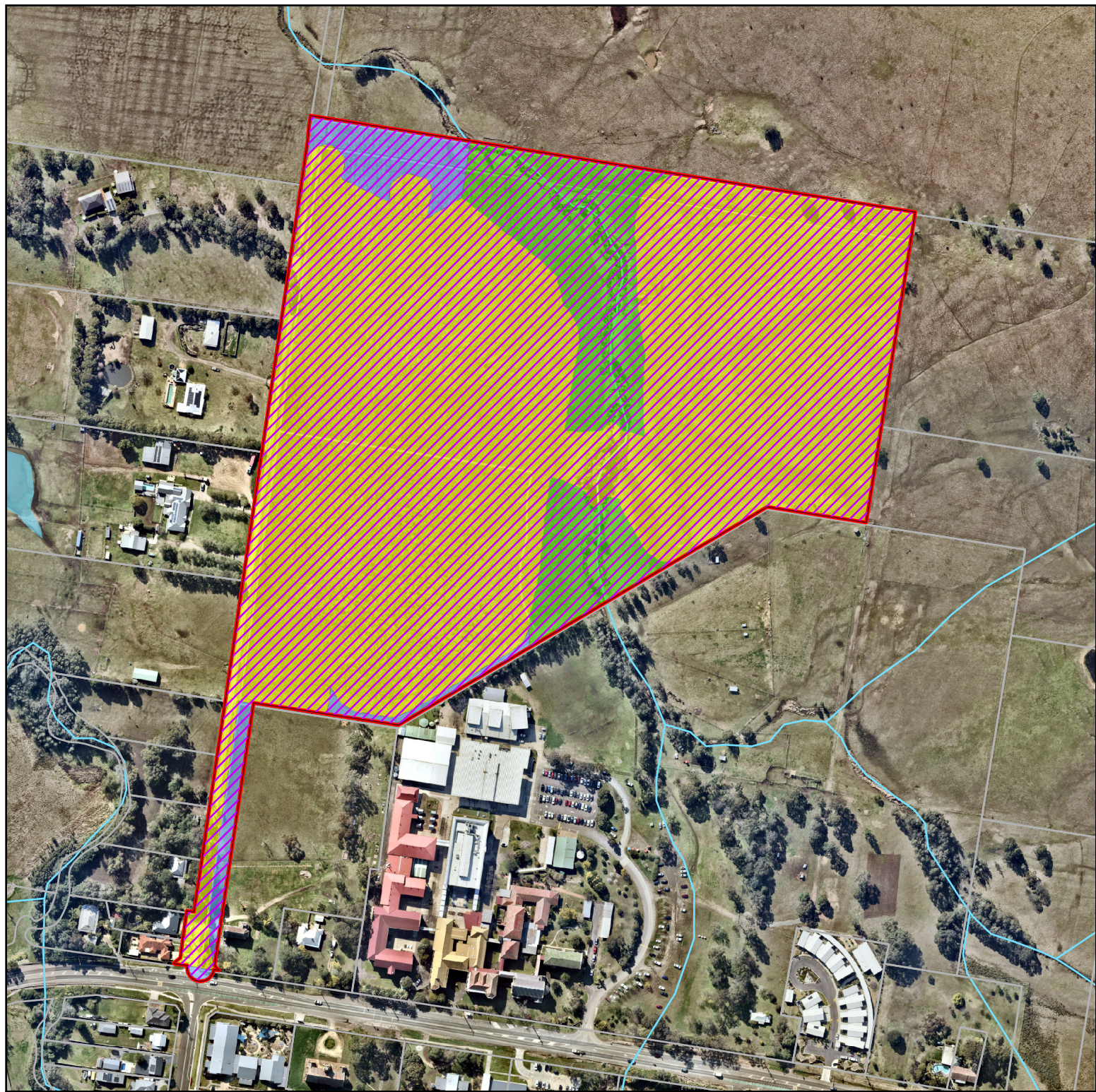
- Regenerate physical and biological functions of the remnant bushland present within the BMP Lands to improve habitat values and connectivity for locally occurring biota.
- Enable natural and facilitated regeneration where appropriate, ensuring the structural and trophic complexity of the vegetation community is adequately represented;
- Reconstruct highly disturbed areas that cannot naturally regenerate to stabilise and reinstate landforms, and vegetation communities that are generally representative of those present prior to disturbance;
- Improve the state of the riparian corridor to strengthen the resilience of Key Fish Habitat as identified within Slapdash Creek;
- Develop management actions detailed using the ‘SMART’ goals approach (Specific, Measurable, Achievable, Reasonable and Time bound); and
- Ensure the site is maintained until vegetation in rehabilitated areas achieves a self-sustaining state requiring nominal maintenance.

7.3 Summary of measures to avoid and minimise impacts

The detailed design for development application lodgement has undertaken detailed ecological constraints analysis to ensure the hierarchy of biodiversity principles being Avoid, minimise and offset are applied to this proposal.

Table 21: Avoidance and minimisation measures for direct, indirect and prescribed impacts

Action	Outcome	Regeneration Measures	Timing	Responsibility
Avoidance of riparian areas	Completed. The project design has avoided impacts to riparian areas where possible.	As described above the unnamed creek requires the removal of the two (2) blockages to fish passage and the eroded bed and bank restored. After completion of these works the BMP Lands will be regenerated and protected as outlined in the BMP.	Design phase	The proponent
Avoidance of TECs	None identified within the Subject Site. It is noted that the unnamed Creek is located in upper tributaries of the Hunter River which is an important catchment for both key wetlands, including Ramars wetland and other key environments that support listed species and communities	Sediment and erosion controls are to be implemented to reduce impacts on the Hunter River Catchment.	Design phase	The proponent
Regeneration of vegetation	To be managed under a BMP, focusing on re-vegetation and habitat regeneration	Regenerated and protected as outlined in the BMP.	5-year management plan	The proponent, BRC, and Project Ecologist



Legend

- Study Area
- Cadastre
- Impacted Area

Impact Type

- Development Footprint
- Regeneration Area
- Landscape Plantings

Address: 20 & 20A Cantwell Rd and 60 New England Hwy, Lochinvar NSW
Client: Trustee RCC Diocese M N | AEP Ref: 4951 | Date: January 2025

Imagery: NearMap, downloaded 8/8/2024
Spatial Reference: GDA2020 MGA Zone 56

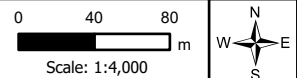


Figure 7 - Impact and Regeneration Area



Disclaimer: While all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Note:
1. Boundaries are not survey accurate
2. Do not scale off this plan

8.0 Impact assessment

8.1 Direct impacts

8.1.1 Residual direct impacts

Residual impacts on native vegetation associated with the development have been significantly reduced following the avoidance measures detailed above. Threatened species impacts have been avoided through avoidance of suitable habitat identified in the wider Study Area. The proposal would predominately impact Planted Native Vegetation (*Cynodon dactylon*), with relatively small patches of remnant vegetation proposed to be removed. In total, the proposal would remove 15.5ha of native vegetation as summarised in **Table 22** below.

Table 22: Summary of residual impacts

Direct impact	BC Act status	EPBC Act status	SAIL entity	Project phase/timing of impact	Extent (ha)
Removal of 0.39ha of PCT 3433 – Severely Degraded	-	Does not conform to EPBC Act criteria	No	Construction	0.39
Removal of 0.11ha PCT 4023 – Poor	-	Does not conform to EPBC Act criteria	No	Construction	0.11
Removal of 15ha Planted Native Vegetation (<i>Cynodon dactylon</i>)	-	Does not conform to EPBC Act criteria	No	Construction	15

8.1.2 Change in vegetation integrity scores

Residual impacts on vegetation condition after avoidance and minimisation measure have been carried out are document in **Table 23**.

Table 23: Impacts to vegetation integrity

Vegetation zone	PCT ID	Area (ha)	Before development				After development				Change
			Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score
PCT 3433 – Severely Degraded	3433	0.39	16	10.1	0.3	5.5	0	0	0	0	-5.5
PCT 4023 – Poor	4023	0.11	35.4	54.3	48.5	45.3	0	0	0	0	-45.3

8.2 Indirect impacts

Indirect impacts have been assessed with respect to each stage of the project. Possible indirect impacts are primarily associated within the construction phase, and future impacts will be mitigated through measure provided in this report.

Table 24: Summary of residual indirect impacts

Indirect impact	Impacted entities	Extent (ha)	Frequency	Duration	Project phase/ timing of impact	Likelihood and consequences
Indirect impacts to adjacent to vegetation associated with construction works	PCT 3233 and 4023	0.5	Dust, noise, and other indirect impacts associated with construction	Short term	Construction	Indirect impacts are considered likely during construction. This includes machinery access and laydown areas. To account for this, temporary fencing will be installed to reduce impacts on the unnamed creek..
Indirect impacts to the watercourse during construction of the crossing including changes to water regimes and flow	N/A	0.39	During construction	Short term	Construction	The likelihood of indirect impacts to Unnamed Creek, such as changes in water flows, is considered likely due to the necessary upgrades to the creek crossing. These changes could potentially alter the hydrology of the creek, affecting water quality

Indirect impact	Impacted entities	Extent (ha)	Frequency	Duration	Project phase/ timing of impact	Likelihood and consequences
						and aquatic habitats. The Aquatic Ecology Report (AEP 2024a) has provided specific recommendations to mitigate these risks, including measures to stabilise water flow, control erosion, and protect aquatic ecosystems. Implementing these recommendations is expected to minimise the consequences of altered water flows and preserve the ecological integrity of Unnamed Creek.
Weed invasion and edge effects	PCT 3233 and 4023	All PCT	During construction	Short term	Construction	The vegetation on the proposal site is already impacted by weeds, and additional edge effects from the development are not expected to be significant. While edge effects, such as changes in vegetation structure, increased exotic plant growth, and altered fauna behaviour, can result from construction activities, the site and surrounding areas have already been extensively cleared for agriculture. Remnant vegetation patches, may experience some additional edge effects, but these will be offset through active management under a BMP.
Pests and pathogens	N/A	N/A	During construction	Short term	Construction	Construction activities can potentially introduce or spread pathogens like Phytophthora (<i>Phytophthora cinnamomi</i>), Myrtle Rust (<i>Austropuccinia psidii</i>), and Chytrid fungus (<i>Batrachochytrium dendrobatidis</i>) into native vegetation. Although the risk of impact from these pathogens is low due to the already disturbed nature

Indirect impact	Impacted entities	Extent (ha)	Frequency	Duration	Project phase/ timing of impact	Likelihood and consequences
						of much of the Subject Lands , appropriate measures such as equipment and machine washdowns.
Noise, light and vibration	N/A	N/A	During construction	Short term	Construction	Construction of the proposal will introduce additional vehicles and machinery to the site, leading to temporary increases in noise and vibration. While the site currently has limited existing noise pollution, the fauna inhabiting the area may still be sensitive to these disturbances. However, given the temporary nature of these activities, the impact on resident fauna is expected to be minimal and unlikely to result in significant long-term effects
Sedimentation and erosion	N/A	N/A	During construction	Short term	Construction	The proposed causeway upgrade to unnamed Creek has the potential to cause sedimentation and erosion in both the construction site and adjacent aquatic habitats due to soil disturbance during the upgrades. To mitigate these risks, appropriate soil and erosion control measures should be implemented, ensuring that all activities adhere to the recommendations provided in the Aquatic Ecological Report.

8.3 Prescribed impacts

Prescribed impacts relevant to the proposal are described below.

8.3.1 Human-made structures

The project involves the development of a creek crossing and residential housing. These activities are confined to already disturbed areas and are designed to improve functionality while minimising environmental disturbance. The construction impacts will be localised and temporary, and are not anticipated to impact any threatened entities.

8.3.2 Non-native vegetation

Development activities are primarily situated within land exempt from the LLS Act, which is dominated by non-native vegetation due to extensive historical agricultural use. This area offers highly limited habitat value and the impact on non-native vegetation is considered appropriate and sustainable, as it avoids significant disturbance to higher quality habitat.

8.3.3 Habitat connectivity

The existing habitat connectivity within the broader landscape is notably fragmented, predominantly due to extensive agricultural activities, with remaining connectivity largely restricted to riparian corridors like the watercourse which itself has experienced substantial clearing. The project has been planned to restore riparian zones, particularly in the northeastern sections, and regenerating a wildlife corridor, thereby reducing fragmentation within the region. While some minor impacts on already limited connectivity may occur, these are mitigated through the implementation of a BMP that aims to restore and enhance habitat linkages over time, contributing to improved ecological connectivity in the locality.

8.3.4 Waterbodies, water quality and hydrological processes

As outline in **Section 7.2.1** the proposed creek crossing over the watercourse presents potential risks to local water quality and hydrological processes through possible sedimentation and erosion during construction activities. Recommendations are provided in the Aquatic Ecology Report to mitigate impacts, and re-vegetation efforts are designed to improve hydrological processes in the long term.

8.4 Mitigating residual impacts – management measures and implementation

Proposed measures to mitigate residual indirect impacts on habitat is detailed in **Table 25**.

Table 25: Summary of proposed mitigation and management measure for residual impacts

Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy	MNES
Implementation of recommendations detailed in the AER (AEP 2024a) for the creek crossing	Established pre-clearance protocols	Pre-construction / clearing	Continuous during construction	Construction contractor / Project Manager	High (Low risk of failure)	N/A
Environmental induction for all workers covering ecological values and protection measures	Training and induction sessions	Pre-construction / clearing	Once before work begins	Construction contractor	High (Low risk of failure)	N/A
Regular inspection and maintenance of erosion and sediment control measures	Inspections and routine maintenance	Pre-construction / clearing	Regular intervals during work	Construction contractor	High (Low risk of failure)	N/A
Fence off or mark trees and areas of native vegetation to be retained	Erect physical barriers and markers	Pre-construction / clearing	Once before clearing	Construction contractor / Arborist	High (Low risk of failure)	N/A
Establishment of appropriate buffers around retained trees	Avoidance of Structural Root Zones	Pre-construction / clearing	Once before clearing	Construction contractor / Site ecologist	High (Low risk of failure)	N/A
Restriction of stockpiles to existing cleared areas	Stockpile management in designated areas	Construction / clearing	Continuous during construction	Construction contractor	High (Low risk of failure)	N/A
Application of water to stockpile areas during windy conditions	Dust suppression by watering	Construction / clearing	As needed during windy conditions	Construction contractor	High (Low risk of failure)	N/A
Construction traffic restricted to existing roads and tracks	Traffic management and routing	Construction / clearing	Continuous during construction	Construction contractor	High (Low risk of failure)	N/A

9.0 Serious and irreversible impacts

9.1 Assessment for serious and irreversible (SAIL) impacts on biodiversity values

The determination of a serious and irreversible impact (SAIL) on biodiversity values must be made by the decision-maker, following the four principles outlined in the *Biodiversity Conservation Regulation 2017*. This section identifies which biodiversity values could be at risk of an SAIL due to the Project and evaluates the impact's extent and severity.

Consideration of species and/or TECs listed as an SAIL entities has been assessed in **Sections 4.3** and **Section 5.0** and no impacts are considered likely to those species.

It is considered the proposed development will not result in SAIL to biodiversity values and no further assessment is required.

10.0 Impact summary

10.1 Determining an offset requirement for impacts

10.1.1 Impacts on native vegetation and TECs or ECs (ecosystem credits)

Impacts on native vegetation that require an offset are provided in **Tables 26, 27** and **Figure 4** and **7**.

Table 26: Impacts that require offset - ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	TEC association	Entity at risk of an SAI?	Current VI score
PCT 3433 – Severely Degraded	3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	0.39	No	N	5.5
PCT 4023 – Poor	4023 - Coastal Valleys Riparian Forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.11	Yes	N	45.3

Table 27: Impact Assessment for PCTs that require an offset - ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
PCT 3433 – Severely Degraded	3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	0.39	5.5	0	-5.5	2	0
PCT 4023 – Poor	4023 - Coastal Valleys Riparian Forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.11	45.3	0	-45.3	2	2
Total Ecosystem Credits								2

10.2 Impacts that do not need further assessment

Areas which will be impacted by the Project but do not need further assessment for ecosystem credits are identified in **Table 28** and **Figure 7**.

Table 28: Impacts that do not need further assessment for ecosystem credits

Impact	Extent within Subject Land (ha)	Justification why no further assessment is required
Planted Native	15	Planted native grasslands have been assessed as low conservation grasslands.
Clearing of Infrastructure	1.15	Areas devoid of vegetation due to existing tracks and infrastructure.

11.0 Biodiversity Credit Report

The following credits are required for offset as part of the development.

Table 29: Ecosystem credit class and matching credit profile

Ecosystem Credit	Attributes shared with matching credits						
	PCT Name	PCT Vegetation Class	PCT Vegetation Formation	Associated TEC or EEC	Offset trading group (BAM Section 10.2, Tables 4 & 5)	Hollow bearing trees present?	IBRA Subregion
0	3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Hunter-Macleay Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass sub-formation)	<i>Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions</i>	3433, 3442, 3443, 3444, 4158	No	Sydney Basin and NSW North Coast Bioregions
2	4023 - Coastal Valleys Riparian Forest	Coastal Floodplain Wetlands	Coastal Floodplain Wetlands	<i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	1731, 3962, 3963, 3985, 3987, 3993, 4016, 4023, 4026, 4027, 4028, 4030, 4035, 4038, 4040, 4048, 4049, 4050, 4056	No	New South Wales North Coast, Sydney Basin and South East Corner Bioregions

12.0 References

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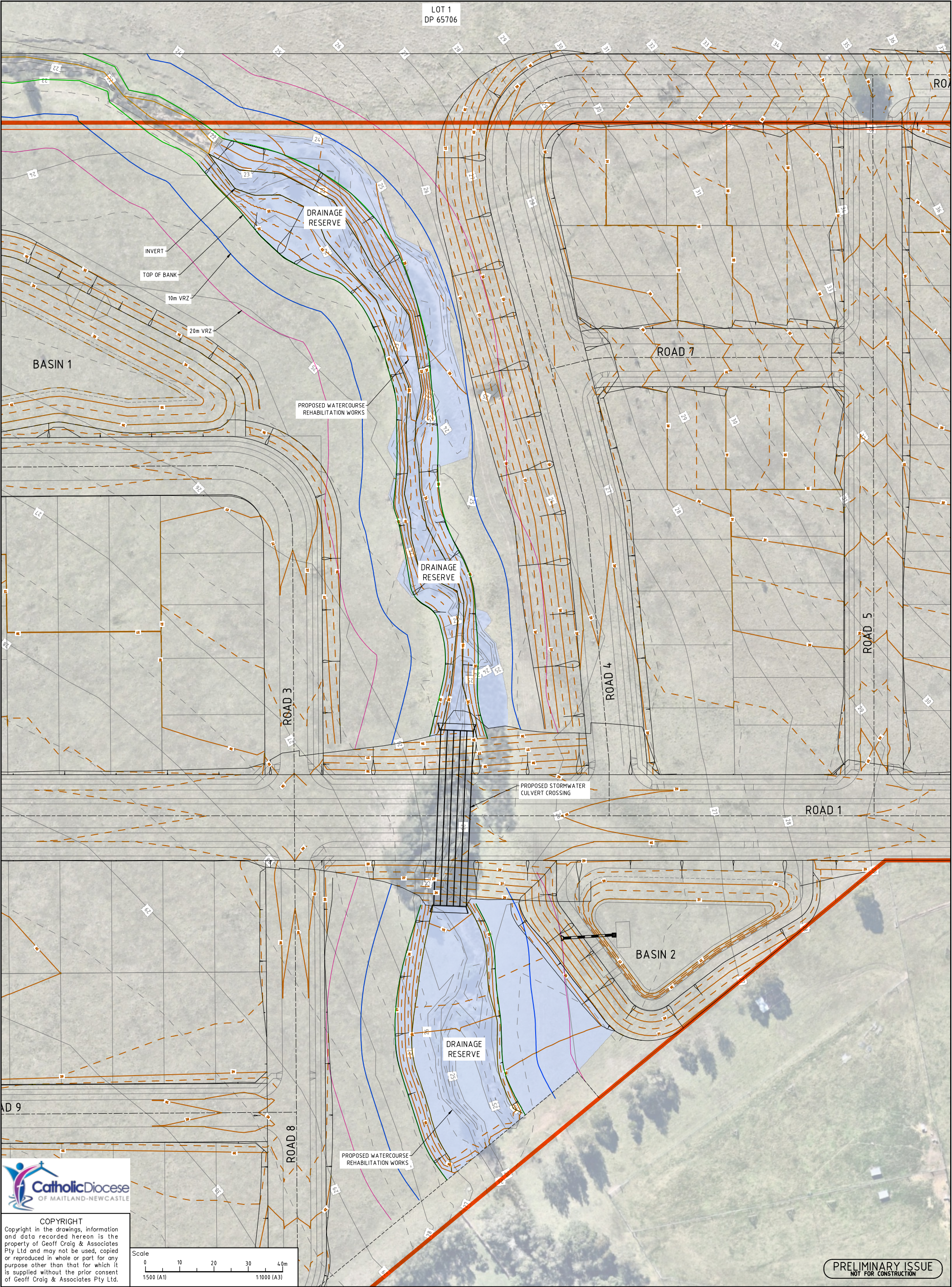
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Appendix A: Proposed Development Plan

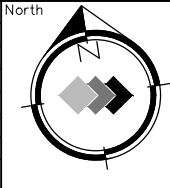


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PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

REVISION	Description	Drawn	App'd	Date
2	ADDED INV, TOB, VRZ LINEWORK	AS	AS	09.01.25
1	ORIGINAL ISSUE	DB	AS	17.12.24



Designed DB	Scale 1:500
Cad Reference 23290C dSK11 r1	
Project Approval IAN HILL (B.E) Consulting Civil Engineer	



A.B.N. 92 086 017 745
1 HARTLEY DRIVE, THORNTON NSW 2322
PO BOX 3337, THORNTON NSW 2322
PHONE: (02) 4964 1811

PROPOSED RESIDENTIAL SUBDIVISION
20 & 20A CANTWELL ROAD
LOCHINVAR
WATERCOURSE REHABILITATION PLAN

Project No 23290C	
Drawing No SK11	Revision 2
A1 SHEET	

Appendix B: SBDAR Requirements Compliance

Biodiversity Development Assessment Report: Streamlined Assessment Module (Small Area)

BAM Reference	Information	BDAR Section	Completed
Report			
Introduction - Chapters 2 and 3	Introduction to the biodiversity assessment including: brief description of proposed development identification of subject land boundary, including: operational footprint and construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure general description of the subject land	1.1.1, 1.1.3	✓
	Sources of information used in the assessment, including reports and spatial data	1.5	✓
	Identification of assessment method applied (i.e., linear or site-based)	2.1	✓
Landscape - Section 3.1, 3.2 and Appendix E	General description of subject land topographic and hydrological setting, geology and soils	2.1.1	✓
	Percent native vegetation cover in the assessment area (as described in BAM Subsection 3.2(4.))	3.3	✓
	IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	3.2.1	✓
	Rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3–4.) and Appendix E)	3.2.2	✓
	Wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(4.))	3.2.2	✓
	Connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	3.2.3	✓
	Areas of geological significance and soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(10.))	3.2.4	✓
Native vegetation, TECs and vegetation integrity - Chapter 4	Patch size (in accordance with BAM Subsection 4.3.2)	4.4	✓
	Identification of the dominant PCT on the subject land and extent (ha) with justification of method used (existing information or plot-based survey data)	2.2.3 4.2	✓
	Identification of any TEC associated with the PCT (BAM Subsection 4.2.2)	9.1	✓
	Estimate of percent cleared value of dominant PCT (BAM Subsection 4.2.1(5.))	4.2.2.	✓

BAM Reference	Information	BDAR Section	Completed
	Identification of any TEC on site that is not associated with the dominant PCT (Note: This TEC is required to be assessed and offset.)	N/A	
	Equivalence with mapping units of previous vegetation maps reviewed as part of the assessment (i.e., equivalent mapping units)	2.2.1	✓
	Vegetation integrity of the PCT(s) on the subject land as individual vegetation zones	4.5	✓
	Justification for how this was determined (i.e., qualitatively by observing values for the condition attributes set out in Table 2 of the BAM or quantitatively by collecting field data for the condition attributes at a plot in accordance with BAM Subsection 4.3.4)	2.2.3	✓
	Use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsections 4.3.3(5.)) Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A): - identify the PCT or vegetation class for which local benchmark data will be applied - identify published sources of local benchmark data (if benchmarks obtained from published sources) - describe methods of local benchmark data collection (if reference plots used to determine local benchmark data) - provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	4.5.3	✓
Chapter 5 and Section 9.1	Describe the review of existing information and any field survey undertaken to assess habitat constraints and microhabitats for threatened species within the subject land	2.4.2	✓
	Determination of the suite of threatened species likely to occur on or use the proposed site according to Steps 1 and 2 in BAM Section 5.2 including species to be assessed for ecosystem credits and the list of species to be assessed for species credits	5.1.2	✓
	List of ecosystem credit species derived from the TBDC (as described in BAM Subsections 5.2.1 and 5.2.2) with justification for the exclusion of any ecosystem credit species based on habitat constraints (as described in BAM Subsection 5.2.2)	5.1.1	✓
	Identification of candidate species credit species that are at risk of an SAI and therefore, must be further assessed (BAM Section 9.1). Note: Candidate species credit species that are not at risk of an SAI and not incidentally recorded on the subject land do not require further assessment.	N/A	
	For candidate species credit species that are at risk of an SAI, a description of the species, any habitat constraints or microhabitats associated with the species on the subject land and information used to create the species polygon/s in accordance with Steps 3 to 5 of BAM Section 5.2 including:	N/A	

BAM Reference	Information	BDAR Section	Completed
	- justification for determining that a candidate species credit species at risk of an SAll is unlikely to have suitable habitat on the subject land or specific vegetation zone (based on a field assessment of the subject land and published literature or an expert report prepared in accordance with Box 3 of the BAM) - determination of the presence of remaining candidate species credit species at risk of an SAll (by assuming presence, conducting a threatened species survey or an expert report). - Note: If the subject land is mapped on an important habitat map for a species, or for a component of its habitat, the subject land is considered to have suitable habitat for the species to be present. - species polygons identifying the location and area of suitable habitat for each candidate threatened species at risk of an SAll that is recorded on the subject land and is measured by area, OR - species polygons identifying the area of suitable habitat and targeted surveys identifying the count and location of individuals on the subject land for each candidate threatened flora species at risk of an SAll that is recorded on the subject land and is measured by count - species polygons for each threatened species identified on the subject land that is not at risk of an SAll (i.e., incidentally observed during site visit)		
	Determination of habitat condition within species polygon/s for each threatened species (measured by area) at risk of an SAll or incidentally observed during the site visit (Step 6 of BAM Section 5.2)	N/A	
	For flora species credit species at risk of an SAll or incidentally observed during site visit, provide a count, or an estimation, of the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(4.))	N/A	
Prescribed impacts Chapter 6	Any prescribed impacts from the small area proposal must be set out in the BDAR consistent with Appendix K	8.3	✓
Avoid and minimise impacts – Chapter 7	Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative: - modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology - alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location - alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	7.1, 7.2	✓

BAM Reference	Information	BDAR Section	Completed
	Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Subsections 7.1.2 and 7.2.2)	7.1, 7.2	✓
	Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	7.1, 7.2	✓
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	Determine the impacts on native vegetation and threatened species habitat, including: - description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Sections 8.1) - description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal (as described in BAM Subsection 8.2)	8.1, 8.2	✓
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Subsections 8.4.1 and 8.4.2, including (as described in BAM Subsection 8.4.1(2.)): - techniques, timing, frequency and responsibility - identify measures for which there is risk of failure - evaluate the risk and consequence of any residual impacts - document any adaptive management strategy proposed	8.4	✓
	Identification of measures for mitigating impacts related to: displacement of resident fauna (as described in BAM Subsection 8.4.1) indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.)) mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	8.4	✓
	Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	N/A	
Thresholds for assessing and offsetting the impacts of the proposal - Chapter 9	Information from the TBDC and/or other sources to report on the current status of threatened species, threatened populations at risk of an SAI and TEC/s for the proposal, and	9.1	✓
	Report on impacts of the proposal on TEC/s in accordance with BAM Subsection 9.2.1	10.1.1	✓
	Report on impacts of the proposal on threatened species and/or threatened populations at risk of an SAI in accordance with BAM Section 9.1	N/A	✓
	Identification of impacts requiring offset in accordance with BAM Section 9.2	10.1.1	✓
	Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	10.1.1	✓

BAM Reference	Information	BDAR Section	Completed
	Identification of areas not requiring assessment in accordance with BAM Section 9.3	10.2	✓
Applying the no net loss standard - Chapter 10	Description of the impact on PCTs/TECs	10	✓
	Description of the impact on threatened species at risk of an SAI or incidentally observed via site visit	N/A	
	Number of ecosystem credits required for impacts on biodiversity values according to BAM Subsection 9	10.1.1	✓
	Number of species credits required for impacts on biodiversity values according to BAM Subsection 10.1.3, including any species credit species that has been incidentally observed on the subject land Note: Species credits for any species at risk of an SAI are calculated in the event that the decision-maker forms the opinion that the proposed impact is unlikely to be serious and irreversible and therefore can be offset.	N/A	
	Identification of credit class for ecosystem credits and species credits according to BAM Section 10.2 (this can be generated from BAM-C)	11	✓
Maps			
Introduction - Chapters 2 and 3	Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure.	Figure 1	✓
Landscape - Section 3.1, 3.2 and Appendix E	Site Map - boundary of subject land - cadastre of subject land - landscape features identified in BAM Subsection 3.1.3 - areas of outstanding biodiversity value within the subject land	Figure 2	✓
	Location Map - digital aerial photography at 1:1,000 scale or finer boundary of subject land: 1500 m buffer area or 500 m buffer for linear development - landscape features identified in BAM Subsection 3.1.3 - additional detail (e.g., local government area boundaries) relevant at this scale - areas of outstanding biodiversity value within the assessment area	Figure 2	✓
	Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or - IBRA bioregions and subregions - rivers, streams and estuaries	Figure 2	✓

BAM Reference	Information	BDAR Section	Completed
	- wetlands and important wetlands - connectivity of different areas of habitat - areas of geological significance and soil hazard features		
Native vegetation, TECs and vegetation integrity - Chapter 4	Map of native vegetation extent for the subject land (as described in BAM Section 3.1)	Figure 2	✓
	Map of PCT/vegetation zones within the subject land (as described in BAM Section 4.2(1.))	Figure 4	✓
	Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure 5	✓
	Map of TEC distribution on the subject land	Figure 4	✓
	Patch size of native vegetation (as described in BAM Subsection 4.3.2)	N/A	
Chapter 5 and Section 9.1	Map of species credit species records within the subject land and species polygons for flora and fauna species at risk of an SAIL or incidentally observed during the site visit (as described in BAM Subsection 5.2.5(1–7.))	NA	
Prescribed impacts Chapter 6	If relevant, maps showing location of any prescribed impact features (i.e., karst, caves, crevices, cliffs, rocks, humanmade structures, etc.)	NA	
Avoid and minimise impacts – Chapter 7	Map of final proposal footprint, including construction and operation	Appendix A	✓
	Maps demonstrating indirect impact zones where applicable	N/A	✓
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	No Maps		
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	No Maps		
Thresholds for assessing and offsetting the impacts of the proposal - Chapter 9	Map showing the extent of TECs at risk of an SAIL within the subject land	Figure 4	✓
	Map showing the location of threatened species at risk of an SAIL within the subject land	N/A	
	Map showing location of: impacts requiring offset	Figure 7	✓

BAM Reference	Information	BDAR Section	Completed
	- impacts not requiring offset - areas not requiring assessment		
Applying the no net loss standard - Chapter 10	No Maps		
Tables			
Native vegetation, TECs and vegetation integrity - Chapter 4	Table of current vegetation integrity scores for vegetation zone within the site including: - composition condition score - structure condition score - function condition score	Table 10	✓
	Report from BAM-C including vegetation integrity scores (BAM Section 4.4)	Appendix J	✓
Chapter 5 and Section 9.1	Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and: identifying any ecosystem credit species removed from the list of species on the basis of further assessment in accordance with BAM Subsections 5.2.2 and 5.2.3 identifying the sensitivity to gain class of each species (BAM Section 5.4)	Table 11	✓
	Table detailing species credit species within the subject land at risk of an SAI (BAM Section 9.1) or incidentally observed during the site visit including any associated habitat feature/components and its abundance (flora)/extent of habitat (flora and fauna) and biodiversity risk weighting (BAM Sections 5.2–5.4)	Table 12	✓
Prescribed impacts Chapter 6	Table showing the prescribed impacts.	Table 14	✓
Avoid and minimise impacts Chapter 7	Table of measures to be implemented before, during and after construction to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Table 20	✓
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2	Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 17	✓
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5	Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Table 15	✓

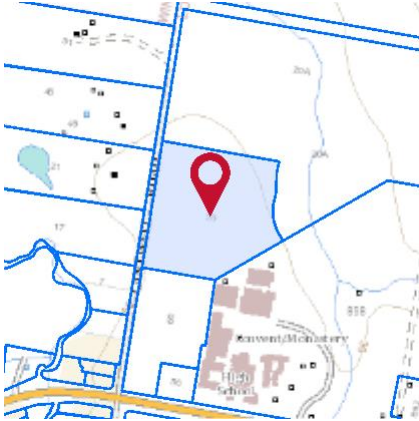
BAM Reference	Information	BDAR Section	Completed
Thresholds for assessing and offsetting the impacts of the proposal - Chapter 9	No Tables		
Applying the no net loss standard - Chapter 10	Table of BC Act listing status for PCTs and threatened species requiring offset	Table 5	✓
	Table of PCTs requiring offset and number of ecosystem credits required (Subsection 10.2.1)	Table 25	✓
	Table of species at risk of an SAI or incidentally observed on site assessed for species credits and the number of credits required	N/A	
	BAM-C credit report	Appendix J	✓
Data			
Landscape - Section 3.1, 3.2 and Appendix E	All report maps as separate jpeg files / Individual digital shape files of: - subject land boundary - assessment area (i.e., buffer area) boundary - cadastral boundary of subject land - areas of native vegetation cover - areas of habitat connectivity	Attached Files	✓
Native vegetation, TECs and vegetation integrity - Chapter 4	All report maps as separate jpeg files - Plot field data (MS Excel format) - Digital shape files for all maps and spatial data - Field data sheets (if relevant) for determining vegetation integrity (BAM Subsection 4.3.4)		✓
Chapter 5 and Section 9.1	- Digital shape files of species polygons - Species polygon map in jpeg format - Expert reports and any supporting data used to support conclusions of the expert report - Field data sheets (if relevant) for threatened species surveys		✓

BAM Reference	Information	BDAR Section	Completed
Prescribed impacts Chapter 6	- If relevant, digital shape files of prescribed impact feature locations - Prescribed impact features map in jpeg format		✓
Avoid and minimise impacts – Chapter 7	Digital shape files of: - final proposal footprint - direct and indirect impact zones - Maps in jpeg format		✓
Assessment of Impacts - Chapter 8, Section 8.1 and 8.2			✓
Mitigation and Management of Impacts - Chapter 8, Section 8.4 and 8.5			✓
Thresholds for assessing and offsetting the impacts of the proposal - Chapter 9	Digital shape files of: extent of TECs at risk of an SAI within the subject land threatened species at risk of an SAI within the subject land boundary of impacts requiring offset boundary of impacts not requiring offset boundary of areas not requiring assessment Maps in jpeg format		✓
Applying the no net loss standard - Chapter 10			✓

Appendix C: Biodiversity Values Map and Threshold Tool Report

Property Report

20 CANTWELL ROAD LOCHINVAR 2321



Property Details

Address: 20 CANTWELL ROAD LOCHINVAR 2321
Lot/Section 1/-/DP1299958
/Plan No:
Council: MAITLAND CITY COUNCIL

Summary of planning controls

Planning controls held within the Planning Database are summarised below. The property may be affected by additional planning controls not outlined in this report. Please contact your council for more information.

Local Environmental Plans	Maitland Local Environmental Plan 2011 (pub. 16-12-2011)
Land Zoning	R1 - General Residential: (pub. 21-4-2023)
Height Of Building	NA
Floor Space Ratio	NA
Minimum Lot Size	450 m ²
Heritage	Holy Trinity Church Significance: Local
Land Reservation Acquisition	NA
Foreshore Building Line	NA
Acid Sulfate Soils	Class 5
Urban Release Area	Urban Release Area
Greenfield Housing Code Area	Complying Development Code: https://www.planningportal.nsw.gov.au/greenfield-housing-code
	Building type: 1-2 storey homes, residential alterations and additions
	Development consent authority: Council or accredited certifier
	Note: Applications which meet all relevant requirements in the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be approved within 20 days. Exclusions may apply. https://legislation.nsw.gov.au/#/view/EPI/2008/572/full

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Detailed planning information

State Environmental Planning Policies which apply to this property

State Environmental Planning Policies can specify planning controls for certain areas and/or types of development. They can also identify the development assessment system that applies and the type of environmental assessment that is required.

- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Allowable Clearing Area (pub. 21-10-2022)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Subject Land (pub. 2-12-2021)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Greenfield Housing Code Area (pub. 6-5-2018)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Land Application (pub. 12-12-2008)
- State Environmental Planning Policy (Housing) 2021: Land Application (pub. 26-11-2021)
- State Environmental Planning Policy (Industry and Employment) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Planning Systems) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Primary Production) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Resilience and Hazards) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Resources and Energy) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Sustainable Buildings) 2022: Land Application (pub. 29-8-2022)
- State Environmental Planning Policy (Transport and Infrastructure) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development: Land Application (pub. 26-7-2002)

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Property Report

20 CANTWELL ROAD LOCHINVAR 2321

Other matters affecting the property

Information held in the Planning Database about other matters affecting the property appears below. The property may also be affected by additional planning controls not outlined in this report. Please speak to your council for more information

Bushfire Prone Land	Vegetation Category
Housing and Productivity Contribution	Housing and Productivity Contribution Lower Hunter Region_A&A
Local Aboriginal Land Council	MINDARIBBA
Regional Plan Boundary	Hunter

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Property Report

20A CANTWELL ROAD LOCHINVAR 2321



Property Details

Address: 20A CANTWELL ROAD LOCHINVAR 2321
 Lot/Section 2/-/DP1299958
 /Plan No:
 Council: MAITLAND CITY COUNCIL

Summary of planning controls

Planning controls held within the Planning Database are summarised below. The property may be affected by additional planning controls not outlined in this report. Please contact your council for more information.

Local Environmental Plans	Maitland Local Environmental Plan 2011 (pub. 16-12-2011)
Land Zoning	C3 - Environmental Management: (pub. 21-4-2023) R1 - General Residential: (pub. 21-4-2023)
Height Of Building	NA
Floor Space Ratio	NA
Minimum Lot Size	40 ha 450 m ²
Heritage	NA
Land Reservation Acquisition	NA
Foreshore Building Line	NA
Acid Sulfate Soils	Class 5
Riparian Lands and Watercourses	Watercourse
Urban Release Area	Urban Release Area

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Property Report

20A CANTWELL ROAD LOCHINVAR 2321

Greenfield Housing Code Area

Complying Development Code:

<https://www.planningportal.nsw.gov.au/greenfield-housing-code>

Building type: 1-2 storey homes, residential alterations and additions

Development consent authority: Council or accredited certifier

Note: Applications which meet all relevant requirements in the State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 may be approved within 20 days. Exclusions may apply.

<https://legislation.nsw.gov.au/#/view/EPI/2008/572/full>

Detailed planning information

State Environmental Planning Policies which apply to this property

State Environmental Planning Policies can specify planning controls for certain areas and/or types of development. They can also identify the development assessment system that applies and the type of environmental assessment that is required.

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)



Property Report

20A CANTWELL ROAD LOCHINVAR 2321

- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Allowable Clearing Area (pub. 21-10-2022)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021: Subject Land (pub. 2-12-2021)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Greenfield Housing Code Area (pub. 6-5-2018)
- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Land Application (pub. 12-12-2008)
- State Environmental Planning Policy (Housing) 2021: Land Application (pub. 26-11-2021)
- State Environmental Planning Policy (Industry and Employment) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Planning Systems) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Primary Production) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Resilience and Hazards) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Resources and Energy) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy (Sustainable Buildings) 2022: Land Application (pub. 29-8-2022)
- State Environmental Planning Policy (Transport and Infrastructure) 2021: Land Application (pub. 2-12-2021)
- State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development: Land Application (pub. 26-7-2002)

Other matters affecting the property

Information held in the Planning Database about other matters affecting the property appears below. The property may also be affected by additional planning controls not outlined in this report. Please speak to your council for more information

Bushfire Prone Land	Vegetation Category
Housing and Productivity Contribution	Housing and Productivity Contribution Lower Hunter Region_A&A
Local Aboriginal Land Council	MINDARIBBA
Regional Plan Boundary	Hunter

This report provides general information only and does not replace a Section 10.7 Certificate (formerly Section 149)

Appendix D: Other Legislation

EPBC Act Assessment

A search was conducted in October 2024 for Matters of National Environmental Significance (MNES) as relevant to the EPBC Act. The following MNES are considered in this assessment.

World Heritage Properties:

The site is not a World Heritage area and is not in close proximity to any such area.

National Heritage Places:

The site is not a National Heritage Place and does not contain any matters of national heritage.

Wetlands of International Significance (declared Ramsar wetlands):

The Subject Lands is located approx. 20-30km upstream from Hunter estuary wetlands. No impacts on the hydrology and ecology of the wetlands are expected as a result of the proposed development.

Great Barrier Reef Marine Park:

The site is not part of or within close proximity to the Great Barrier Reef Marine Park.

Commonwealth Marine Areas:

The site is not part of or within close proximity to any Commonwealth Marine Area.

Threatened Ecological Communities (TECs):

PCT 3433 is associated with the following TEC:

- **BC Act listed EEC** *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*. **Assessment of this TEC found that the vegetation on the Subject Lands is not commensurate with this TEC.**

PCT 4023 is associated with the following TEC:

- BC Act listed EEC *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*: and
- EPBC Act listed EEC *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community*.

Assessment of these TECs found that the vegetation on the Subject Lands is not commensurate with them.

Threatened Species:

Protected matters search found 39 EPBC Act listed threatened species to occur within a 10km radius of the Subject Site. Field surveys found no habitat for listed species or any listed threatened species within the Subject Site.

Migratory Species:

Protected Matters search found 13 listed Migratory species to occur within a 10km radius of the Subject Site. No migratory species were found during field surveys. Due to the size and degraded nature of the Subject Site, it is unlikely that any terrestrial-migratory species listed in the EPBC Act would visit the site on an irregular basis. Therefore, it is considered that the proposal is unlikely to significantly affect the availability of potential habitat for such mobile species, or disrupt migratory patterns.

EPBC Act Assessment Conclusion:

Consideration of the EPBC Act revealed that it is unlikely that significant impacts on Matters of National Environmental Significance will occur as a result of the proposal. As such, a referral is not considered likely to be necessary.

Water Management Act 2000

The DPIE (Water) administers the WM Act, and is required to assess activities carried out on waterfront land. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40m of the highest bank of the river, lake, or estuary. Certain activities within this land are defined as a 'controlled activity' and requires approval from the Office of Water.

There is one watercourse in the Subject Lands that will be impacted by the proposal. Therefore, an assessment under the WM Act is required. The Waterfront Land Assessment Report (WLAR) for the Site.

Fisheries Management Act 1994

If in-stream works are proposed, then provisions under Part 7 of the FM Act may be applicable, and an Aquatic Assessment Report (AAR) will be required to be submitted with the DA. The AAR will determine the presence of Key Fish Habitat (KFH) within the site. KFH can be defined as those aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish (all aquatic invertebrates) populations generally, and the survival and recovery of threatened aquatic species (NSW Department of Primary Industries – Fisheries NSW).

There is one unnamed watercourse in the Subject Lands that will be impacted by the proposal. Therefore, an assessment under the FM Act is required.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 4 Koala Habitat Protection 2021 Assessment

State Environmental Planning Policy (Biodiversity and Conservation) 2021 (BC SEPP) commenced on the 1st March 2022, under the Environmental Planning and Assessment Act 1979, and repealing the previous State Environmental Planning Policy (Koala Habitat Protection) 2020 and State Environmental Planning Policy (Koala Habitat Protection) 2021. The aims of Chapter 4 – Koala Protection 2021 are to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

The land which comprises the Subject Lands does not have an approved koala plan of management. According to the BC SEPP 2021, the policy applies if:

4.9 Development assessment process—no approved koala plan of management for land

- (1) This clause applies to land to which this Policy applies if the land—
 - (a) has an area of at least 1 hectare (including adjoining land within the same ownership), and
 - (b) does not have an approved koala plan of management applying to the land.
- (5) However, despite subclauses (3) and (4), the council may grant development consent if the applicant provides to the council –
 - (a) information, prepared by a suitably qualified and experienced person, the council is satisfied demonstrates that the land subject of the development application –
 - i. does not include any trees belonging to the koala use tree species listed in Schedule 2 for the relevant koala management area, or
 - ii. is not core koala habitat,

The entirety of Subject Lands comprises of 16.65ha, over which Chapter 4 of the Biodiversity and Conservation SEPP applies. Furthermore, the site does not have an approved Koala plan of management applying to the land. Site inspections identified that the Subject Lands contains trees that belong to the koala use tree species listed in Schedule 2 for the relevant koala management area, being *Casuarina glauca*.

In regards to identifying core koala habitat, core koala habitat is defined as;

- (a) *an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or*
- (b) *an area of land which has been assessed by a qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.*

Koala Investigation Results

As important koala trees were identified on site additional assessments were undertaken to determine if koalas were present on site and to determine if the site was core koala habitat as per the definitions above.

Survey effort for Koalas included:

- Target searches including nocturnal searches (23/05/2024); and
- Spot Assessment Technique (SAT) (Phillips & Callaghan 2011) – 1 SAT undertaken within Study Area (23/05/2025).

Targeted surveys failed to identify any sign of koala utilisation of the site. Desktop assessment of local records shows that koala records in the area are sparse, with only one (1) record from 2020 north east of site located in Hinton, approximately 4kms from the Subject Site. This record is unlikely to be associated with the Subject Lands, given that it is separated from the Subject Lands by the Hunter River, a series of roads and agricultural lands, with low habitat and connectivity value. As such, the site is unlikely to be Core Koala Habitat; however, taking a precautionary approach, a Tier 2 Assessment has been undertaken.

Tier 2 Assessment

Part A: Presence of highly suitable Koala Habitat

Determine the PCT (using suitable methods) and if PCT have Schedule 2 listed trees an assessment must be undertaken to determine koala presence.

Site inspections confirmed that the Subject Lands contains the following PCTs:

- 0.39ha of PCT 3433 – Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest (Severely Degraded); and
- 0.11ha of PCT 4023 – Coastal Valleys Riparian Forest (Poor).

These PCTs contain Schedule 2 listed trees:

Casuarina glauca was the only species present within the Study Area and Subject Site. Therefore, the site is deemed to have highly Suitable Koala Habitat and a Tier 2 Assessment is required.

Assess BioNet for records - All records within set distance (2.5km OR 5km) in the last 18 years apply = Core Habitat. Requiring a Part B Assessment to determine koala presence.

An assessment of BioNet showed no record within 5km of the Study Area in the last 18 years.

Part B Assessment

i) Koala Presence – Spot Assessment Technique, Nocturnal Survey and Call Playback

Searches for scats following the SAT (Phillips and Callaghan, 2011) were conducted in locations where Potential Koala Habitat (PKH) was present. No Koala scats or tree scratch marks were found during searches at the bases of one hundred and twenty (120) Schedule 2 listed trees within the Subject Lands and Study Area whilst completing one SAT's.

Nocturnal surveys did not record any evidence of koala habitation, nor did call playback record any response. Furthermore, Song Meter deployed in the Study Area did not record any koalas, nor did camera trapping record any evidence.

ii) Koala Records

No records

Table - Koala Assessment

Principles	Criteria	Assessment
Introduction	Describe the nature of the proposed development.	The proposal is the development of a staged subdivision for residential lots. Some areas of native vegetation will be impacted by the development Out of the areas identified within the Subject Site, a total of 0.5ha of native vegetation is proposed to be removed or modified.
	Define how the SEPP applies to the proposed development.	Refer above to Tier 1 and Tier 2 Assessment.

Principles	Criteria	Assessment
Koala habitat values – addressing criteria 1 and 2	Describe the site area, including the general environment and condition, location and extent of the development area and any other areas that may be directly or indirectly impacted by the proposed development.	The Subject Lands located in Lochinvar NSW comprises 0.39ha of forested vegetation and cleared agricultural areas. Development would entail the removal of all vegetation on site. The proposal has been designed to avoid or mitigate as many impacts to biodiversity as possible under the Avoid and Minimise principle as set out in BAM 2020.
	Provide details of koala survey as undertaken in accordance with Appendix C. This should include details of the results of the koala surveys, including how the site area meets the definition of core koala habitat and mapping that shows habitat areas and koala records within the site area and adjoining areas.	One SAT and nocturnal were conducted within the Study Area.
	Describe the site context (including mapping showing habitat that might be associated with vegetation in the adjoining landscape and records within the vicinity of the site area) and provide an analysis of the koala habitat values (including how koalas might use the site area and the relative importance of the site area to a local koala population).	PCTs 4023 and 2433 were identified within the Study Area. These PCTs have Schedule 2 listed trees and multiple species were listed within the Study Area. Given that surveys failed to find evidence of Koala usage or habitation within the Study Area, it is considered that there is no current local population present that would utilise the site.
Measures taken to avoid impacts to koalas – addressing criteria 3, 4, 5, 6, 7 and 8	Describe the site selection process, including how koala habitat was taken into account and any avoidance outcomes achieved through this process.	Targeted surveys failed to identify any sign of koala utilisation of the site. As such, it was determined that it is unlikely that Koalas are present within the Study Area.
	Describe how the proposed development avoids or minimises direct impacts to koala habitat and habitat function within the site area.	The Avoid and Minimise process has been undertaken: locating the development on lands predominantly cleared, disturbed or under scrubbed. Given that it is highly likely that no koala population is present, no further action was considered necessary.
Analysis of potential impacts – addressing criteria 9	Identify the residual direct impacts to koalas and koala habitat within the site area, including the nature and extent of impacts and the likely implications for the viability of a local koala population.	Surveys failed to find any sign of koala presence within the Study Area, in which most of this area has been disturbed, managed or cleared.
	Identify the relevant potential indirect impacts to koalas and koala habitat within the site area and adjacent	Desktop and field surveys did not produce evidence of a local koala population in the Study Area or

Principles	Criteria	Assessment
	habitat areas, including the nature and extent of potential indirect impacts and the likely implications for the viability of a local koala population.	surrounds. The development is proposed on lands that have been disturbed, managed or cleared. With this in consideration, it is unlikely that any local koala populations will be impacted by the proposed development.
Plan to manage and protect koalas and their habitat – addressing criteria 10, 11, 12 and 13	Describe the management measures that will be implemented as part of proposed construction and operations to manage the direct and indirect impacts identified. These measures should be outcomes focussed and include performance targets.	As stated above, the proposed development occurs on lands that have been disturbed, managed or cleared, on which no evidence of koala usage was recorded. Hence, impacts on local koala populations are not expected to occur.
	Describe any compensatory measures that will be delivered, including an analysis of the suitability of these measures against criteria 9 and 10.	No specific koala offsets required because of the lack of a koala population that could utilise the site.
	Outline a plan for monitoring, adaptive management and reporting against the key outcomes and performance targets.	Not applicable, as no local koala population is likely to be present.

Conclusion

Field surveys identified that the site contained suitable habitat, with one Schedule 2 listed trees recorded within the Study Area, the Subject Lands is situated on lands of disturbed or cleared native vegetation, with surrounding lots in similar condition. As no koalas were identified as present on or using the site, the site is not considered to be core koala habitat and it is not anticipated that the proposal will impact koalas in the present or future.

State Environment Planning Policy (Resilience and Hazards) 2021

The Subject Lands is not mapped as having any Coastal Wetlands or Littoral Rainforests in accordance with the *State Environmental Planning Policy (Resilience and Hazards) 2021* (R&H SEPP). However, a Stormwater Management Plan must be developed to demonstrate that both the quality and quantity of stormwater leaving the site is not affected by the proposed development.

AEP has reviewed the Stormwater Management plan prepared by GCA Engineering Solutions and determined that the proposed system meets the required targets for water quality in the Hunter River. Below are extracted from the 2025 report, demonstrating compliance.

Treatment targets for the proposed development were adopted from MCC's MOES and are shown in Table 4-1.

Table 4-1: Stormwater treatment objectives.

Pollutant	Stormwater treatment objectives
Total Suspended Solids (TSS)	80% retention of average annual load
Total Phosphorous (TP)	45% retention of average annual load
Total Nitrogen (TN)	45% retention of average annual load
Gross Pollutants (GP)	70% retention of average annual load

Table 4-2: Comparison of Catchment 3's water quality targets.

Pollutant	ADW Johnson - Average Annual Surface Generation	ADW Johnson - Achieved Reduction (Pollutants Retained)	GCA - Average Annual Surface Generation	GCA - Achieved Reduction (Pollutants Retained)
Total Suspended Solids (TSS; kg/year)	1600	80.7%	1817	80%
Total Phosphorous (TP; kg/year)	3.21	64.4%	3.17	45%
Total Nitrogen (TN; kg/year)	22	48.2%	24.63	45%
Gross Pollutants (GP; kg/year)	335	100%	351.6	70%

Appendix E: Flora List

Family	Scientific Name	Common Name
Amaranthaceae	<i>Amaranthus spp.</i>	Amaranth
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass
Poaceae	<i>Axonopus fissifolius</i>	Narrow-leafed Carpet Grass
Poaceae	<i>Bothriochloa macra</i>	Red Grass
Brassicaceae	<i>Cardamine hirsuta</i>	Common Bittercress
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak
Solanaceae	<i>Cestrum parqui</i>	Green Cestrum
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle
Commelinaceae	<i>Commelina spp.</i>	
Asteraceae	<i>Conyza bonariensis</i>	Flaxleaf Fleabane
Poaceae	<i>Cymbopogon refractus</i>	Barbed Wire Grass
Poaceae	<i>Cynodon dactylon</i>	Common Couch
Poaceae	<i>Cynodon spp.</i>	
Apiaceae	<i>Daucus carota</i>	Wild Carrot
Poaceae	<i>Dichanthium sericeum subsp. sericeum</i>	Queensland Bluegrass
Poaceae	<i>Ehrharta erecta</i>	Panic Veldtgrass
Chenopodiaceae	<i>Einadia nutans subsp. linifolia</i>	Climbing Saltbush
Poaceae	<i>Eragrostis elongata</i>	Clustered Lovegrass
Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge
Proteaceae	<i>Hakea teretifolia</i>	Needlebush
Asteraceae	<i>Hypochaeris radicata</i>	Catsear
Juncaceae	<i>Juncus cognatus</i>	
Brassicaceae	<i>Lepidium spp.</i>	
Primulaceae	<i>Lysimachia arvensis</i>	Scarlet Pimpernel
Poaceae	<i>Microlaena stipoides</i>	Weeping Grass
Oleaceae	<i>Olea europaea</i>	Common Olive
Oxalidaceae	<i>Oxalis perennans</i>	
Poaceae	<i>Panicum simile</i>	Two-colour Panic
Poaceae	<i>Paspalum dilatatum</i>	Paspalum
Phyllanthaceae	<i>Phyllanthus virgatus</i>	Wiry Spurge
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues
Poaceae	<i>Poa annua</i>	Winter Grass
Polygonaceae	<i>Rumex spp.</i>	Dock
Asteraceae	<i>Senecio madagascariensis</i>	Fireweed
Poaceae	<i>Setaria parviflora</i>	
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne
Solanaceae	<i>Solanum americanum</i>	Glossy Nightshade
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade
Poaceae	<i>Sporobolus africanus</i>	Parramatta Grass
Poaceae	<i>Sporobolus creber</i>	Slender Rat's Tail Grass
Poaceae	<i>Sporobolus spp.</i>	Rat's Tail Couch
Caryophyllaceae	<i>Stellaria media</i>	Common Chickweed

Family	Scientific Name	Common Name
Verbenaceae	<i>Verbena bonariensis</i>	Purpletop
Verbenaceae	<i>Verbena quadrangularis</i>	
Campanulaceae	<i>Wahlenbergia communis</i>	Tufted Bluebell

Appendix F: Vegetation Survey Data

1

100

Lochinvar

Job no:

4951

Date:

Mapped Regional Vegetation community:

[illegible]

								Amaranthus spp.			
								Solanum nigrum			
								Stellaria media			
Total Cover		70					0				
Arrival time:	9			Departure time:	10.15	Weather:	Overcast	TWO transect photos (one landscape, one portrait) taken	Done	Transect GPS points taken	Done
Start easting/northing:	355,455		6381410		End easting/northing:	355,464	6381434	Zone:		Bearing:	14
Tree Stem Size Class at DBH	Presence(TRUE)/Absence(FALSE)	Number	Count of Hollow Bearing Trees	Leaf Litter Cover within 5 x 1m2 sub-plots							
< 5 cm	TRUE		1		Leaf litter	Live vegetation	Bare ground	Rocks	Other	Total	
5 - 9 cm	TRUE		1	30	5	65	0	0	100		
10 – 19 cm	TRUE		2	25	10	80	0	0	115		
20 – 29 cm	TRUE	0	Length of logs (m)	3	10	40	10	0	0	60	
30 – 49cm	FALSE		0	4	5	80	5	0	10	100	
50 -79cm	FALSE		0	5	10	80	10	0	0	100	
>80cm	FALSE	0		Average	16	43	34	0	2	95	
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)											

Modified plot, 10x25.

Habitat features, comments and incidental fauna observations:

Plot no: 2 Job: Lochinvar Job no: 4951 Date:

Mapped Regional Vegetation community:

Upper stratum				Unknown (Comment)				C				Ab				Mid stratum				Unknown (Comment)				C				Ab				Lower stratum											
																Hakea sericea				hakea teretifolia				0.5				10				Axonopus fissifolius											
																																Cynodon dactylon											
																																Cymbopogon refractus											
																																Aristida vagans											
																																Senecio madagascariensis											
																																Hypochaeris radicata											
																																Juncus cognatus											
																																Sporobolus creber											
																																Paspalum dilatatum											
																																Eragrostis elongata											
																																Gamochaeta purpurea											
																																Microlaena stipoides											
Arrival time:				1030								Departure time:								Weather:				Partly cloudy				TWO transect photos (one landscape, one portrait) taken				Done				Transect GPS points taken							
Start easting/northing:				355,549				6381545								End easting/northing:				355,559				6381496				Zone:								Bearing:							
Tree Stem Size Class at DBH				Presence(TRUE)/Absence(FALSE)				Number				Count of Hollow Bearing Trees				Leaf Litter Cover within 5 x 1m2 sub-plots																											
< 5 cm				FALSE								0								Leaf litter				Live vegetation				Bare ground				Rocks				Other				T			

5 - 9 cm	FALSE			1	5	80	10	0	5	2
10 – 19 cm	FALSE			2	10	50	40	0	0	2
20 – 29 cm	FALSE		Length of logs (m)	3	5	40	65	0	5	2
30 – 49cm	FALSE	0	0	4	5	40	70	0	5	2
50 -79cm	FALSE	0		5	10	50	60	0	0	2
>80cm	FALSE	0		Average	7	52	49	0	3	2

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Vegetation heavily disturbed from cattle. Lots of bear ground and hoof prints.

Habitat features, comments and incidental fauna observations:

Plot no: 3 Job: lochinvar Job no: 4951 Date:

Mapped Regional Vegetation community:

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	Unknown (Comment)	C	Ab	Lower stratum
								Axonopus fissifolius
								Paspalum dilatatum
								Cynodon dactylon
								Eragrostis elongata
								Sporobolus creber
								Sporobolus africanus
								Senecio madagascariensis
								Cymbopogon refractus
								Juncus cognatus
								Plantago lanceolata
								Gamochaeta purpurea
								Conyza bonariensis
								Bothriochloa macra
								Dichanthium sericeum subsp. sericeum
								Verbena quadrangula
								Setaria parviflora
								Phyllanthus virgatus
								Fimbristylis dichotoma
								Panicum simile
Total Cover		0				0		

Arrival time:	1150		Departure time:	1220	Weather:	Overcast	TWO transect photos (one landscape, one portrait) taken	Done	Transect GPS points taken	
Start easting/northing:	355,329	6381503		End easting/northing:	355,352	6381550	Zone:		Bearing:	
Tree Stem Size Class at DBH	Presence(TRUE)/Absence(FALSE)	Number	Count of Hollow Bearing Trees	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	FALSE		0		Leaf litter	Live vegetation	Bare ground	Rocks	Other	T
5 - 9 cm	FALSE		1	2	50	70	0	0	1	
10 – 19 cm	FALSE		2	5	60	55	0	0	1	
20 – 29 cm	FALSE		Length of logs (m)	3	2	30	80	0	5	1
30 – 49cm	FALSE	0	0	4	1	70	30	0	5	1
50 -79cm	FALSE	0		5	2	35	65	0	0	1
>80cm	FALSE	0		Average	2.4	49	60	0	2	1
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
Habitat features, comments and incidental fauna observations:										

Plot no: 4 Job: Lochinvar Job no: 4951 Date:

Mapped Regional Vegetation community:

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	Unknown (Comment)	C	Ab	Lower stratum
								Axonopus fissifolius
								Paspalum dilatatum
								Cynodon dactylon
								Senecio madagascariensis
								Plantago lanceolata
								Hypochaeris radicata
								Gamochaeta purpurea
								Eragrostis elongata
								Sporobolus creber
								Verbena bonariensis
								Sporobolus africanus
								Juncus cognatus
								Setaria parviflora
								Conyza bonariensis
								Wahlenbergia communis
Total Cover		0				0		

20mx20m plot = 400m² Note: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m

Arrival time:	1225	Departure time:	1.15	Weather:	sunny	TWO transect photos (one landscape, one portrait) taken	Done	Transect GPS points taken	Done
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Start easting/northing:	355,301	6381329		End easting/northing:	355,338	6381362	Zone:	56	Bearing:	
Tree Stem Size Class at DBH	Presence(TRUE)/Absence(FALSE)	Number	Count of Hollow Bearing Trees	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	FALSE		0		Leaf litter	Live vegetation	Bare ground	Rocks	Other	Total
5 - 9 cm	FALSE		1	15	75	10	0	0	1	
10 – 19 cm	FALSE		2	20	70	10	0	0	1	
20 – 29 cm	FALSE		Length of logs (m)	3	15	80	5	0	0	1
30 – 49cm	FALSE	0	0	4	20	65	15	0	0	1
50 -79cm	FALSE	0		5	20	50	30	0	0	1
>80cm	FALSE	0		Average	18	68	14	0	0	1
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
cattle tracks and grazing										
Habitat features, comments and incidental fauna observations:										

Plot no: 5 Job: Lochinvar Job no: 4951 Date:

Mapped Regional Vegetation community: Not native

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	Unknown (Comment)	C	Ab	Lower stratum	
								Sporobolus africanus	Sp Afr
								Hypochaeris radicata	Hy rac
								Plantago lanceolata	Pla lan
								Axonopus fissifolius	Ax gra
								Gamochaeta purpurea	cu
								Cynodon dactylon	Cy
								Senecio Madagascariensis	Se Ma
								Eragrostis brownii	Er
								Nothoscordum borbonicum	No bo
								Setaria pumila	Se
								Verbena bonariensis	Ve bo
								Juncus cognatus	Ju
Total Cover		0				0			

Arrival time:	11:00		Departure time:	11:45	Weather:	10°C foggy	TWO transect photos (one landscape, one portrait) taken	Done	Tansect GPS points taken	Done
Start easting/northing:	355,508	6381393		End easting/northing:	355,559	6381406	Zone:	56	Bearing:	
Tree Stem Size Class at DBH	Presence(TRUE)/Absence(FALSE)	Number	Count of Hollow Bearing Trees	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	FALSE		0		Leaf litter	Live vegetation	Bare ground	Rocks	Other	Total
5 - 9 cm	FALSE		1	20	40	60	0	0	1	
10 – 19 cm	FALSE		2	0	35	75	0	0	1	
20 – 29 cm	FALSE		Length of logs (m)	3	0	50	50	0	0	1
30 – 49cm	FALSE	0	0	4	0	50	50	0	0	1
50 -79cm	FALSE	0		5	0	40	60	0	0	1
>80cm	FALSE	0		Average	4	43	59	0	0	1
Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)										
Habitat features, comments and incidental fauna observations:										

Plot no: 6 Job: Lochinvar Job no: 4951 Date:

Mapped Regional Vegetation community:

Upper stratum	Unknown (Comment)	C	Ab	Mid stratum	Unknown (Comment)	C	Ab	Lower stratum	
								Juncus acutus subsp. acutus	Ju
								Typha orientalis	Ty
								Machaerina juncea	Ba
								Pericaria decipiens	Pe
								Rumex crispus	Ru
								Senecio Madagascariensis	Se Ma
								Plantago lanceolata	Pla lan
								Conyza spp.	Co
								Lobelia concolor	Lo
								Aster subulatus	As
								Cynodon dactylon	Cy
								Bothriochloa macra	Bo ma
								Gamochaeta purpurea	Ga Am
								Sporobolus africanus	Sp Afr
								Rumex brownii	Ru
								Soliva sessilis	Bi
								Cardamine flexuosa	Ca
								Trifolium repens	Tri

									Hypochaeris radicata	Ca
									Bolboschoenus caldwellii	Bo ca
									Medicago polymorpha	Me
									Paspalum dilatatum	Pa dil
									Onopordum acanthium subsp. acanthium	So
									Solanum nigrum	So
									Centella asiatica	Ce
									juncus usitatus	Ju
									Ranunculus sceleratus	Ra sc
									Verbena bonariensis	Ve bo
Arrival time:	12:00		Departure time:	13:30	Weather:	11°C overcast, breeze	TWO transect photos (one landscape, one portrait) taken	Done	Transect GPS points taken	Do
Start easting/northing:	355,409	6381641		End easting/northing:	355,437	6381613	Zone:	56	Bearing:	
Tree Stem Size Class at DBH	Presence(TRUE)/Absence(FALSE)	Number	Count of Hollow Bearing Trees	Leaf Litter Cover within 5 x 1m2 sub-plots						
< 5 cm	FALSE		0		Leaf litter	Live vegetation	Bare ground	Rocks	Other	To
5 - 9 cm	FALSE			1	2	50	50	0	0	1

10 – 19 cm	FALSE			2	90	2	0	0	20	1
20 – 29 cm	FALSE		Length of logs (m)	3	0	0	0	0	0	
30 – 49cm	FALSE	0	0	4	95	1	0	0	5	1
50 -79cm	FALSE	0		5	30	0	0	0	50	8
>80cm	FALSE	0		Average	43.4	10.6	10	0	15	7

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

In eroded Creek line. Difficult to measure. Plot measured 10m wide x 35m long. Approx 333m2. I tried to keep it rectangular and top of. Bank to top of bank.

Habitat features, comments and incidental fauna observations

Did 1m2 sub plots at every 7m, 2. 5 from central line starting at 3m on left. Other is water

Appendix G: PCT Determination Justification

Table i: Determination for Plot 1

Plot No		1			
Potential PCTs		4023	4027	4016	4028
Regional Vegetation					
IBRA Region		Sydney Basin;	NSW North Coast; South East Corner; Sydney Basin;	South Eastern Queensland;	NSW North Coast; South East Corner; Sydney Basin;
IBRA Subregion		Cumberland; Hunter;	Karuah Manning; Bateman; Hunter; Illawarra; Jervis; Pittwater; Sydney Cataract; Yengo;	Clarence Lowlands;	Coffs Coast and Escarpment; Karuah Manning; Macleay Hastings; Bateman; Cumberland; Hunter; Illawarra; Jervis; Pittwater; Sydney Cataract; Wyong; Yengo;Burraborang; Cumberland; Yengo;
IBRA Comments		Not specified	Not specified	Not specified	Not specified
NSW Landscapes		Not specified	Not specified	Not specified	Not specified
LGA		BLACKTOWN; CAMDEN; CESSNOCK; LIVERPOOL; PENRITH; SINGLETON; THE HILLS SHIRE;	CENTRAL COAST; EUROBODALLA; HORNSBY; KURING-GAI; LANE COVE; MID-COAST; NEWCASTLE; NORTHERN BEACHES; RYDE; SHELLHARBOUR; SHOALHAVEN; SUTHERLAND SHIRE; WOLLONGONG; BAYSIDE;	CLARENCE VALLEY;	BELLINGEN; CANTERBURY-BANKSTOWN; CENTRAL COAST; COFFS HARBOUR; EUROBODALLA; HORNSBY; KIAMA; LAKE MACQUARIE; LIVERPOOL; MID-COAST; NAMBUCCA VALLEY; NEWCASTLE; NORTHERN BEACHES; SHOALHAVEN; SUTHERLAND SHIRE; WOLLONGONG; BAYSIDE; PORT STEPHENS; RYDE; BLACKTOWN; CAMDEN; CAMPBELLTOWN; FAIRFIELD; HAWKESBURY; LIVERPOOL; CITY OF PARRAMATTA; PENRITH; RYDE; THE HILLS SHIRE; WOLLONDILLY;
Key Diagnostic Species Listed	Tree	<i>Casuarina glauca</i> , <i>Eucalyptus moluccana</i> , <i>Eucalyptus amplifolia</i> , <i>Acacia parramattensis</i> , <i>Eucalyptus tereticornis</i> , <i>Acacia decurrens</i> , <i>Angophora floribunda</i> , <i>Grevillea robusta</i> , <i>Angophora subvelutina</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> , <i>Corymbia maculata</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus eugenioides</i>	<i>Casuarina glauca</i> , <i>Avicennia marina</i> subsp. <i>australasica</i> , <i>Cupaniopsis anacardioides</i> , <i>Acacia maidenii</i> , <i>Banksia integrifolia</i> , <i>Ficus rubiginosa</i> , <i>Glochidion ferdinandi</i> , <i>Melaleuca quinquenervia</i> , <i>Planchonella australis</i>	<i>Casuarina glauca</i> , <i>Melaleuca quinquenervia</i>	<i>Casuarina glauca</i> , <i>Melaleuca quinquenervia</i> , <i>Cupaniopsis anacardioides</i> , <i>Glochidion ferdinandi</i> , <i>Eucalyptus robusta</i> , <i>Acacia maidenii</i> , <i>Avicennia marina</i> subsp. <i>australasica</i> , <i>Notelaea longifolia</i> , <i>Acacia binervata</i> , <i>Banksia integrifolia</i> , <i>Celtis paniculata</i> , <i>Eucalyptus botryoides</i> , <i>Eucalyptus longifolia</i> , <i>Eucalyptus resinifera</i> , <i>Eucalyptus tereticornis</i> , <i>Ficus rubiginosa</i> , <i>Grevillea robusta</i> , <i>Streblus brunonianus</i>
	Shrub	<i>Bursaria spinosa</i> , <i>Eremophila debilis</i> , <i>Breynia oblongifolia</i> , <i>Melaleuca styphelioides</i> , <i>Melaleuca decora</i> , <i>Rubus parvifolius</i> , <i>Solanum cinereum</i> , <i>Acacia implexa</i> , <i>Hibbertia diffusa</i> , <i>Melaleuca linariifolia</i> , <i>Melaleuca thymifolia</i> , <i>Ozothamnus diosmifolius</i> , <i>Phyllanthus hirtellus</i> , <i>Pittosporum revolutum</i> , <i>Teucrium junceum</i> , <i>Trema tomentosa</i> var. <i>aspera</i>	<i>Suaeda australis</i> , <i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i> , <i>Aegiceras corniculatum</i> , <i>Acacia longifolia</i> , <i>Myoporum acuminatum</i> , <i>Enchylaena tomentosa</i> , <i>Goodenia ovata</i> , <i>Breynia oblongifolia</i> , <i>Pittosporum undulatum</i> , <i>Rhagodia candolleana</i> subsp. <i>candolleana</i> , <i>Acacia mearnsii</i> , <i>Claoxylon australe</i> , <i>Commersonia fraseri</i> , <i>Homalanthus populifolius</i> , <i>Melaleuca decora</i> , <i>Melaleuca styphelioides</i> , <i>Melicytus dentatus</i> , <i>Phyllanthus gunnii</i>		<i>Melaleuca ericifolia</i> , <i>Goodenia ovata</i> , <i>Myoporum acuminatum</i> , <i>Acacia longifolia</i> , <i>Melaleuca styphelioides</i> , <i>Pittosporum undulatum</i> , <i>Melaleuca linariifolia</i> , <i>Homalanthus populifolius</i> , <i>Callistemon salignus</i> , <i>Melaleuca nodosa</i> , <i>Myrsine howittiana</i> , <i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i> , <i>Suaeda australis</i> , <i>Acacia implexa</i> , <i>Acacia mearnsii</i> , <i>Astrotricha floccosa</i> , <i>Breynia oblongifolia</i> , <i>Cassinia longifolia</i> , <i>Chloanthus stoechadis</i> , <i>Dillwynia retorta</i> , <i>Dodonaea triquetra</i> , <i>Ficus coronata</i> , <i>Hibiscus diversifolius</i> , <i>Leptospermum polygalifolium</i> , <i>Monotoca elliptica</i> , <i>Myoporum boninense</i> subsp. <i>australe</i> , <i>Myrsine variabilis</i> , <i>Ozothamnus diosmifolius</i> , <i>Polyscias sambucifolia</i> , <i>Rhagodia candolleana</i> subsp. <i>candolleana</i> , <i>Santalum obtusifolium</i>
	Grass	<i>Microlaena stipoides</i> , <i>Oplismenus aemulus</i> , <i>Echinopogon ovatus</i> , <i>Cynodon dactylon</i> , <i>Entolasia marginata</i> , <i>Juncus usitatus</i> , <i>Paspalidium distans</i> , <i>Aristida ramosa</i> , <i>Aristida vagans</i> , <i>Eragrostis brownii</i> , <i>Fimbristylis dichotoma</i> , <i>Rytidosperma racemosum</i> , <i>Dichelachne micrantha</i> , <i>Echinopogon caespitosus</i> , <i>Lomandra longifolia</i> , <i>Themeda triandra</i> , <i>Bothriochloa macra</i> , <i>Cyperus gracilis</i> , <i>Eragrostis leptostachya</i> , <i>Lachnagrostis filiformis</i> , <i>Chloris truncata</i> , <i>Entolasia stricta</i> , <i>Lomandra filiformis</i> , <i>Carex inversa</i> , <i>Cymbopogon refractus</i> , <i>Eriochloa pseudoacrotricha</i> , <i>Lomandra multiflora</i> subsp. <i>multiflora</i> , <i>Rytidosperma tenuius</i> , <i>Austrostipa ramosissima</i> , <i>Austrostipa verticillata</i> , <i>Carex appressa</i> , <i>Carex breviculmis</i> , <i>Chloris divaricata</i> var. <i>divaricata</i> , <i>Juncus planifolius</i> ,	<i>Juncus kraussii</i> subsp. <i>australiensis</i> , <i>Phragmites australis</i> , <i>Cynodon dactylon</i> , <i>Sporobolus virginicus</i> , <i>Ficinia nodosa</i> , <i>Bolboschoenus caldwellii</i> , <i>Machaerina juncea</i> , <i>Microlaena stipoides</i> , <i>Carex appressa</i> , <i>Entolasia marginata</i> , <i>Typha orientalis</i> , <i>Zoysia macrantha</i> , <i>Carex inversa</i> , <i>Echinopogon ovatus</i> , <i>Entolasia stricta</i> , <i>Fimbristylis ferruginea</i> , <i>Isolepis cernua</i> , <i>Juncus subsecundus</i> , <i>Juncus usitatus</i> , <i>Lepyrodia muelleri</i> , <i>Oplismenus imbecillis</i> , <i>Paspalum distichum</i> , <i>Poa meionectes</i>	<i>Pseudoraphis spinescens</i> , <i>Bolboschoenus caldwellii</i> , <i>Phragmites australis</i>	<i>Machaerina juncea</i> , <i>Juncus kraussii</i> subsp. <i>australiensis</i> , <i>Phragmites australis</i> , <i>Gahnia clarkei</i> , <i>Entolasia marginata</i> , <i>Sporobolus virginicus</i> , <i>Cynodon dactylon</i> , <i>Fimbristylis ferruginea</i> , <i>Hemarthria uncinata</i> , <i>Cyperus polystachyos</i> , <i>Lomandra longifolia</i> , <i>Microlaena stipoides</i> , <i>Ficinia nodosa</i> , <i>Imperata cylindrica</i> , <i>Machaerina articulata</i> , <i>Oplismenus aemulus</i> , <i>Oplismenus imbecillis</i> , <i>Zoysia macrantha</i> , <i>Entolasia stricta</i> , <i>Isolepis cernua</i> , <i>Lachnagrostis filiformis</i> , <i>Carex appressa</i> , <i>Cladium procerum</i> , <i>Juncus usitatus</i> , <i>Pseudoraphis paradoxa</i> , <i>Carex maculata</i> , <i>Gahnia sieberiana</i> , <i>Ischaemum australe</i> , <i>Isolepis inundata</i> , <i>Machaerina rubiginosa</i> , <i>Paspalum vaginatum</i> , <i>Schoenus brevifolius</i> , <i>Bolboschoenus caldwellii</i> , <i>Carex fascicularis</i> , <i>Cyperus laevigatus</i> , <i>Echinopogon caespitosus</i> , <i>Gahnia filum</i> ,

Plot No		1			
Potential PCTs		4023	4027	4016	4028
		<i>Lomandra confertifolia</i> , <i>Paspalidium albobillosum</i> , <i>Paspalidium aversum</i> , <i>Paspalum distichum</i> , <i>Rytidosperma bipartitum</i> , <i>Scleria mackaviensis</i> , <i>Sporobolus creber</i> , <i>Bolboschoenus caldwellii</i> , <i>Bothriochloa decipiens</i> var. <i>decipiens</i> , <i>Carex longebrachiata</i> , <i>Cyperus imbecillis</i> , <i>Cyperus polystachyos</i> , <i>Dichelachne rara</i> , <i>Digitaria ramularis</i> , <i>Eleocharis cylindrostachys</i> , <i>Elymus scaber</i> , <i>Eragrostis parviflora</i> , <i>Fimbristylis velata</i> , <i>Gahnia aspera</i> , <i>Isolepis inundata</i> , <i>Lachnagrostis aemula</i> , <i>Oplismenus imbecillis</i> , <i>Panicum simile</i> , <i>Sporobolus elongatus</i> , <i>Typha orientalis</i>			<i>Isolepis platycarpa</i> , <i>Lachnagrostis aemula</i> , <i>Leptocarpus tenax</i> , <i>Lepyrodia muelleri</i> , <i>Ottochloa gracillima</i> , <i>Paspalum distichum</i> , <i>Schoenoplectus subulatus</i> , <i>Schoenus apogon</i> , <i>Schoenus lepidosperma</i> , <i>Tetrarrhena juncea</i> , <i>Typha orientalis</i>
	Forb	<i>Brunoniella australis</i> , <i>Dichondra repens</i> , <i>Lobelia purpurascens</i> , <i>Oxalis perennans</i> , <i>Solanum prinophyllum</i> , <i>Centella asiatica</i> , <i>Commelina cyanea</i> , <i>Dianella longifolia</i> , <i>Vernonia cinerea</i> , <i>Veronica plebeia</i> , <i>Asperula conferta</i> , <i>Einadia trigonos</i> , <i>Opercularia diphylla</i> , <i>Plectranthus parviflorus</i> , <i>Rumex brownii</i> , <i>Alternanthera denticulata</i> , <i>Eclipta platyglossa</i> , <i>Einadia hastata</i> , <i>Hypoxis hygrometrica</i> , <i>Phyllanthus virgatus</i> , <i>Wahlenbergia gracilis</i> , <i>Einadia nutans</i> , <i>Einadia polygonoides</i> , <i>Haloragis heterophylla</i> , <i>Hydrocotyle sibthorpioides</i> , <i>Poranthera microphylla</i> , <i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i> , <i>Caesia parviflora</i> , <i>Desmodium rhytidophyllum</i> , <i>Dichondra</i> sp. <i>Inglewood</i> , <i>Lythrum hyssopifolia</i> , <i>Oxytes brachypoda</i> , <i>Senecio hispidulus</i> , <i>Tricoryne elatior</i> , <i>Centipeda minima</i> subsp. <i>minima</i> , <i>Cotula australis</i> , <i>Euchiton sphaericus</i> , <i>Galium gaudichaudii</i> , <i>Galium leiocarpum</i> , <i>Nyssanthes diffusa</i> , <i>Persicaria decipiens</i> , <i>Plantago debilis</i> , <i>Solanum pungetium</i> , <i>Stackhousia viminea</i> , <i>Ajuga australis</i> , <i>Alternanthera angustifolia</i> , <i>Alternanthera nodiflora</i> , <i>Argyrotegium poliochlorum</i> , <i>Arthropodium milleflorum</i> , <i>Arthropodium minus</i> , <i>Arthropodium</i> sp. <i>South-east Highlands</i> , <i>Brunoniella pumilio</i> , <i>Calotis lappulacea</i> , <i>Cycnogeton microtuberosum</i> , <i>Damasonium minus</i> , <i>Daucus glochidiatus</i> , <i>Euchiton involucratus</i> , <i>Galium liratum</i> , <i>Gonocarpus micranthus</i> , <i>Goodenia gracilis</i> , <i>Hypericum gramineum</i> , <i>Lobelia anceps</i> , <i>Mentha diemenica</i> , <i>Mentha satuireioides</i> , <i>Murdannia graminea</i> , <i>Nicotiana suaveolens</i> , <i>Opercularia aspera</i> , <i>Oxalis exilis</i> , <i>Phyllanthus similis</i> , <i>Pseuderanthemum variable</i> , <i>Pseudognaphalium luteoalbum</i> , <i>Ranunculus pumilio</i> , <i>Scaevola albida</i> , <i>Scutellaria humilis</i> , <i>Senecio diaschides</i> , <i>Senecio quadridentatus</i> , <i>Sida corrugata</i> , <i>Stackhousia monogyna</i> , <i>Trachymene incisa</i> subsp. <i>incisa</i> , <i>Triglochin striata</i> , <i>Verbena gaudichaudii</i> , <i>Vittadinia cuneata</i> , <i>Vittadinia sulcata</i> , <i>Wahlenbergia communis</i> , <i>Wurmbea biglandulosa</i>	<i>Tetragonia tetragonoides</i> , <i>Commelina cyanea</i> , <i>Samolus repens</i> , <i>Alternanthera denticulata</i> , <i>Atriplex australasica</i> , <i>Selliera radicans</i> , <i>Apium prostratum</i> , <i>Triglochin striata</i> , <i>Dichondra repens</i> , <i>Lobelia anceps</i> , <i>Persicaria decipiens</i> , <i>Plectranthus parviflorus</i> , <i>Carpobrotus glaucescens</i> , <i>Chenopodium glaucum</i> , <i>Leptinella longipes</i> , <i>Lobelia purpurascens</i> , <i>Lythrum hyssopifolia</i> , <i>Senecio hispidulus</i> , <i>Spergularia tasmanica</i> , <i>Centella asiatica</i> , <i>Crinum pedunculatum</i> , <i>Dianella longifolia</i> , <i>Einadia hastata</i> , <i>Einadia nutans</i> , <i>Einadia trigonos</i> , <i>Hydrocotyle sibthorpioides</i> , <i>Lepidium pseudohyssopifolium</i> , <i>Ludwigia peploides</i> subsp. <i>montevidensis</i> , <i>Opercularia diphylla</i> , <i>Oxalis exilis</i> , <i>Oxalis rubens</i> , <i>Persicaria hydropiper</i> , <i>Portulaca oleracea</i> , <i>Senecio minimus</i> , <i>Sida corrugata</i> , <i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i> , <i>Solanum pungetium</i> , <i>Veronica plebeia</i> , <i>Viola hederacea</i>	<i>Utricularia aurea</i> , <i>Bacopa monnieri</i> , <i>Spirodela polyrhiza</i>	<i>Samolus repens</i> , <i>Lobelia anceps</i> , <i>Apium prostratum</i> , <i>Leptinella longipes</i> , <i>Selliera radicans</i> , <i>Viola banksii</i> , <i>Viola hederacea</i> , <i>Commelina cyanea</i> , <i>Dianella caerulea</i> , <i>Tetragonia tetragonoides</i> , <i>Triglochin striata</i> , <i>Centella asiatica</i> , <i>Alternanthera denticulata</i> , <i>Eclipta platyglossa</i> , <i>Cycnogeton procerum</i> , <i>Enydra woollsii</i> , <i>Hydrocotyle sibthorpioides</i> , <i>Vernonia cinerea</i> , <i>Atriplex australasica</i> , <i>Bacopa monnieri</i> , <i>Centella cordifolia</i> , <i>Cotula australis</i> , <i>Dichondra repens</i> , <i>Einadia hastata</i> , <i>Opercularia aspera</i> , <i>Persicaria decipiens</i> , <i>Senecio glomeratus</i> , <i>Senecio pinnatifolius</i> , <i>Solanum pungetium</i> , <i>Veronica plebeia</i> , <i>Brachyscome graminea</i> , <i>Chenopodium glaucum</i> , <i>Hydrocotyle laxiflora</i> , <i>Hydrocotyle tripartita</i> , <i>Lagenophora stipitata</i> , <i>Liparophyllum exaltatum</i> , <i>Lobelia purpurascens</i> , <i>Mitrasacme paludosa</i> , <i>Ornduffia reniformis</i> , <i>Oxalis exilis</i> , <i>Persicaria strigosa</i> , <i>Pseudognaphalium luteoalbum</i> , <i>Ranunculus inundatus</i> , <i>Senecio bathurstianus</i> , <i>Senecio minimus</i> , <i>Senecio prenanthoides</i> , <i>Solanum prinophyllum</i> , <i>Thyridia repens</i> , <i>Trachymene composita</i>
	Fern	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Cheilanthes distans</i> , <i>Adiantum aethiopicum</i> , <i>Blechnum spinulosum</i> , <i>Hypolepis muelleri</i> , <i>Marsilea hirsuta</i>	<i>Adiantum aethiopicum</i> , <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> , <i>Pellaea falcata</i> , <i>Pteridium esculentum</i>	<i>Azolla pinnata</i>	<i>Hypolepis muelleri</i> , <i>Pteridium esculentum</i> , <i>Platyserium bifurcatum</i> , <i>Pyrrosia rupestris</i> , <i>Cyclosorus interruptus</i> , <i>Telmatoblechnum indicum</i>
	Other	<i>Glycine tabacina</i> , <i>Desmodium varians</i> , <i>Parsonsia straminea</i> , <i>Glycine clandestina</i> , <i>Glycine microphylla</i> , <i>Clematis glycinoides</i> , <i>Polymeria calycina</i> , <i>Eustrephus latifolius</i> , <i>Amyema cambagei</i> , <i>Cayratia clematidea</i> , <i>Glycine tomentella</i> , <i>Marsdenia suaveolens</i> , <i>Pandorea pandorana</i> subsp. <i>pandorana</i> , <i>Smilax glyciophylla</i>	<i>Parsonsia straminea</i> , <i>Dendrobium teretifolium</i> , <i>Amyema congener</i> subsp. <i>congener</i> , <i>Glycine clandestina</i> , <i>Amyema cambagei</i> , <i>Calystegia sepium</i> subsp. <i>roseata</i> , <i>Cayratia clematidea</i> , <i>Clematis glycinoides</i> , <i>Desmodium varians</i> , <i>Eustrephus latifolius</i> , <i>Geitonoplesium cymosum</i> , <i>Gynochthodes jasminoides</i> , <i>Marsdenia rostrata</i> , <i>Passiflora herbertiana</i> subsp. <i>herbertiana</i> , <i>Stephania japonica</i> var. <i>discolor</i> , <i>Tylophora barbata</i>	<i>Parsonsia straminea</i>	<i>Parsonsia straminea</i> , <i>Stephania japonica</i> var. <i>discolor</i> , <i>Livistona australis</i> , <i>Cassytha pubescens</i> , <i>Dendrobium teretifolium</i> , <i>Marsdenia rostrata</i> , <i>Cassytha glabella</i> , <i>Geitonoplesium cymosum</i> , <i>Cynanchum carnosum</i> , <i>Hibbertia scandens</i> , <i>Maclura cochinchinensis</i> , <i>Tylophora barbata</i> , <i>Amyema cambagei</i> , <i>Dendrobium tetragonum</i> , <i>Glycine tabacina</i> , <i>Gynochthodes</i>

Plot No		1			
Potential PCTs		4023	4027	4016	4028
					<i>jasminoides</i> , <i>Kennedia rubicunda</i> , <i>Pandorea pandorana</i> subsp. <i>pandorana</i>
Present Diagnostic Species within Study Area	Tree	<i>Casuarina glauca</i>	<i>Casuarina glauca</i>	<i>Casuarina glauca</i>	<i>Casuarina glauca</i>
	Shrub				
	Grass	<i>Cynodon dactylon</i> , <i>Microlaena stipoides</i>	<i>Cynodon dactylon</i> , <i>Microlaena stipoides</i>	<i>Cynodon dactylon</i> , <i>Microlaena stipoides</i>	<i>Cynodon dactylon</i> , <i>Microlaena stipoides</i>
	Forb	<i>Oxalis perennans</i> , <i>Einadia nutans</i> subsp. <i>linifolia</i>	<i>Einadia nutans</i> subsp. <i>linifolia</i>		<i>Oxalis perennans</i> , <i>Einadia nutans</i> subsp. <i>linifolia</i>
	Fern				
	Other				
PCT Description		A tall <i>Casuarina</i> open forest with a dense grassy ground layer that is found adjacent to streams or on river flats, primarily in the South Creek catchment of the Cumberland Plain to the west of Sydney and from Ellalong to north of Rothbury in the central Hunter valley. The canopy is one of the distinguishing features of this PCT, very frequently including a high cover of relatively young <i>Casuarina glauca</i> amongst a mix of old and young eucalypts, commonly red gums (<i>Eucalyptus amplifolia</i> and <i>Eucalyptus tereticornis</i>) or occasionally <i>Eucalyptus moluccana</i>. The only common species in the sparse shrub layer is <i>Bursaria spinosa</i>. There is a dense ground cover, typical of river flat forests, that is typically comprised of grasses, forbs, twiners and ferns. A high cover of <i>Microlaena stipoides</i> is almost always present, with more scattered <i>Brunoniella australis</i> and <i>Dichondra repens</i> being very frequent. Common ground covers include <i>Solanum prinophyllum</i>, <i>Glycine tabacina</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Oplismenus aemulus</i> and <i>Lobelia purpurascens</i>. It is possible that this PCT represents a successional state in a community that is re-establishing following clearing. In addition, the dominance of the salt tolerant <i>Casuarina glauca</i> may indicate saline conditions. This PCT typically occurs at elevations below 70 metres asl in a hot, dry climate. On broader floodplains of the Cumberland Plain, it grades into PCT 4025, which rarely includes <i>Casuarina glauca</i> however nevertheless has considerable floristic overlap with this PCT. Near the edge of the floodplain, it adjoins the grassy forests of either the Cumberland Plain (PCT 3320) or the Hunter valley (PCT 3315). Again, <i>Casuarina glauca</i> is rare in these PCTs.	A low to very tall, sparse to dense forest, commonly with a saltmarsh ground layer, which occurs at the fringes of estuaries and coastal saline lakes, and on tidal creeks, between Forster and Tuross River. <i>Casuarina glauca</i> is almost always present and is dominant with the highest foliage cover in the canopy, commonly with mangrove <i>Avicennia australasica</i> or rarely <i>Aegiceras corniculatum</i>. The ground layer very frequently includes the forb <i>Tetragonia tetragonioides</i>, the rush <i>Juncus kraussii</i> and forb <i>Suaeda australis</i>, the latter two sometimes locally abundant, commonly <i>Sarcocornia quinqueflora</i> and occasionally patches of <i>Phragmites australis</i> occur where there is more prolonged inundation. This PCT is most extensive in the Sydney and Illawarra areas, with more scattered occurrences elsewhere within its range. It occurs at sites subject to irregular tidal inundation, in mild, moderately wet locations mostly receiving 1020-1260 mm mean annual rainfall, at or close to sea level up to 10 metres asl. This community sometimes occurs as narrow strips along estuarine fringes, however is also part of a tidal zonation where it grades into mangrove PCT 4091 on the seaward side and into PCT 4028 in less saline sites on the landward side.	This placeholder PCT is defined from two plots located in remnant floodplain tall open forest in the Everlasting Swamp area of the lower Clarence valley floodplain, far north coast. Caution is required in the evaluation and assignment of new plots to this PCT. On present knowledge, the tree canopy is dominated by <i>Casuarina glauca</i> and <i>Melaleuca quinquenervia</i>, with no mid-stratum. The ground layer consists of prolonged free-standing water which supports mats of the floating plants <i>Azolla pinnata</i> and <i>Spirodela polyrhiza</i>, and the emergents <i>Utricularia aurea</i> and <i>Pseudoraphis spinescens</i>. This PCT forms a wetland mosaic with PCT 4091 on very low-lying floodplains of less than 10 metres asl. Floodplain wetlands on the north coast are comparatively poorly sampled by standard methods, and this PCT may occur elsewhere on the north coast.	A tall to very tall open forest or woodland featuring <i>Casuarina glauca</i> and usually <i>Machaerina juncea</i> and <i>Juncus kraussii</i> subsp. <i>australiensis</i>, occurring on the edges of tidal estuarine flats and tidal creek flats along the NSW coast, usually at elevations of below 10 metres asl. <i>Casuarina glauca</i> almost always forms a sparse to mid-dense tree layer, rarely accompanied by <i>Melaleuca quinquenervia</i>. A sparse or very sparse small tree or scrub layer of <i>Melaleuca ericifolia</i> is occasionally present, while other <i>Melaleuca</i> species and other trees or shrubs only rarely occur. The mid-dense ground layer is primarily comprised of sedges, rushes, reeds and grasses that are tolerant of inundation, very frequently including <i>Machaerina juncea</i> and <i>Juncus kraussii</i> subsp. <i>australiensis</i>, commonly with <i>Phragmites australis</i>. Other species occasionally occurring in the ground layer include <i>Samolus repens</i>, <i>Lobelia anceps</i> and <i>Gahnia clarkei</i>, while more rare species include <i>Sporobolus virginicus</i>, <i>Apium prostratum</i> and <i>Hemarthria uncinata</i>, the latter three with variable cover from site to site. This PCT has been recorded from Sawtell south to Tuross Head, however is likely to occur elsewhere along the NSW coast on the margins of brackish water bodies and watercourses. It is floristically related to PCT 4026 which occurs in similar environments, however PCT 4028 has a more consistent cover of <i>Casuarina glauca</i> and includes more species that are not tolerant of saline conditions. PCT 4028 occurs at slightly higher elevations than PCT 4026, or further upstream in areas with less frequent inundation. PCT 4028 overlaps spatially in the Hunter region with PCT 4038, with which it also weakly overlaps floristically, however PCT 4038 has thick <i>Melaleuca nodosa</i> which is only very rare and very sparse in PCT 4028.
Other Diagnostic Features			Not specified	Not specified	Not specified
Vegetation Formation		Forested Wetlands;	Forested Wetlands;	Forested Wetlands;	Forested Wetlands;
Vegetation Class		Coastal Floodplain Wetlands;	Coastal Floodplain Wetlands;	Coastal Floodplain Wetlands;	Coastal Floodplain Wetlands;
Landscape Position		Not specified	Not specified	Not specified	Not specified
Elevation		19.7	0	0.4	0
Lithology		Not specified	Not specified	Not specified	Not specified

Plot No	1			
Potential PCTs	4023	4027	4016	4028
PCT Determination	This PCT is considered 'best fit' for the vegetation recorded within Plot 1. The vegetation on site contained the highest floristic match with this PCT along with the percentages. The PCT description describes A tall Casuarina open forest with a dense grassy ground layer that is found adjacent to streams or on river flats. This is an accurate depiction of the vegetation found within this vegetation zone. This PCT is considered the most accurate description of the vegetation community on site.	This PCT was considered due to its identification within the plot to PCT Tool, as well as moderate floristic similarities with species recorded in plot data. However, there are a number of factors that limit the accuracy of this PCT considering the vegetation recorded within the Subject Site. Vegetation association is limited, with several key diagnostic species absent from the Subject Site. This PCT is a coastal floodplain wetland, recorded at 0m elevation. The Subject Lands is significantly higher than this. Thus, this PCT was discounted due to its moderate floristic similarities in conjunction with geographical limitations.	This PCT was considered due to its identification within the plot to PCT tool. Very limited diagnostic species were recorded with correlation to this PCT. Furthermore, this PCT is also not mapped under the STVM anywhere within the surrounding locality or adjoining lots to the Subject Site, it is listed within South East QLD IBRA regions. Thus, this PCT was discounted due to its moderate floristic similarities in conjunction with geographical limitations.	This PCT was considered due to its identification within the plot to PCT Tool, as well as moderate floristic similarities with species recorded in plot data. However, there are a number of factors that limit the accuracy of this PCT considering the vegetation recorded within the Subject Site. Therefore, this PCT was discounted due to the lack of correlation to the vegetation class and formation and that this PCT is located closer to the coast, at lower elevations rather than Lochinvar.
Result	PCT 4023 – Coastal Valleys Riparian Forest			
Estimated Cleared Value of PCT (%)	78.22%			
EEC	Listed BC Act,E: <i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i> (Part) ; This PCT is considered to be commensurate with the state listed TEC for this Subject Lands (Refer Table 12). Listed EPBC Act,E: <i>Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</i> (Part) This PCT is not considered to be commensurate with the federally listed TEC for this Subject Lands (refer Appendix I – Other legislation);			

Table ii: PCT Determination for Plot 6

Plot No	6			
Potential PCTs	4023	4088	3976	3975
Regional Vegetation				
IBRA Region	Sydney Basin;	NSW South Western Slopes; South Eastern Highlands;	South East Corner; Sydney Basin;	NSW North Coast; South East Corner; Sydney Basin;
IBRA Subregion	Cumberland; Hunter;	Inland Slopes; Lower Slopes; Murrumbateman;	Bateman; Illawarra; Jervis;	Karuah Manning; South East Coastal Ranges; Cumberland; Hunter; Illawarra; Wyong; Yengo;
IBRA Comments	Not specified	Not specified	Not specified	Not specified
NSW Landscapes	Not specified	Not specified	Not specified	Not specified
LGA	BLACKTOWN; CAMDEN; CESSNOCK; LIVERPOOL; PENRITH; SINGLETON; THE HILLS SHIRE;	BLAYNEY; GREATER HUME SHIRE; COOTAMUNDRA-GUNDAGAI REGIONAL; NARRANDERA; SNOWY VALLEYS; UPPER LACHLAN SHIRE; WAGGA WAGGA; YASS VALLEY;	EUROBODALLA; SHELLHARBOUR; SHOALHAVEN; WOLLONGONG;	BEGA VALLEY; BLACKTOWN; CENTRAL COAST; CESSNOCK; HAWKESBURY; PORT STEPHENS; WOLLONGONG;
Key Diagnostic Species Listed	Tree			
	<i>Casuarina glauca</i> , <i>Eucalyptus moluccana</i> , <i>Eucalyptus amplifolia</i> , <i>Acacia parramattensis</i> , <i>Eucalyptus tereticornis</i> , <i>Acacia decurrens</i> , <i>Angophora floribunda</i> , <i>Grevillea robusta</i> , <i>Angophora subvelutina</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> , <i>Corymbia maculata</i> , <i>Eucalyptus crebra</i> , <i>Eucalyptus eugenioides</i>	<i>Eucalyptus camaldulensis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> , <i>Acacia dealbata</i> , <i>Eucalyptus bridgesiana</i>	<i>Casuarina glauca</i>	<i>Casuarina glauca</i> , <i>Eucalyptus amplifolia</i> , <i>Eucalyptus tereticornis</i> , <i>Melaleuca quinquenervia</i>

Plot No		6			
Potential PCTs		4023	4088	3976	3975
	Shrub	<i>Bursaria spinosa</i> , <i>Eremophila debilis</i> , <i>Breynia oblongifolia</i> , <i>Melaleuca styphelioides</i> , <i>Melaleuca decora</i> , <i>Rubus parvifolius</i> , <i>Solanum cinereum</i> , <i>Acacia implexa</i> , <i>Hibbertia diffusa</i> , <i>Melaleuca linariifolia</i> , <i>Melaleuca thymifolia</i> , <i>Ozothamnus diosmifolius</i> , <i>Phyllanthus hirtellus</i> , <i>Pittosporum revolutum</i> , <i>Teucrium junceum</i> , <i>Trema tomentosa</i> var. <i>aspera</i>	<i>Kunzea ericoides</i> , <i>Acacia deanei</i> , <i>Acacia implexa</i> , <i>Acacia rubida</i> , <i>Bursaria spinosa</i> , <i>Callistemon sieberi</i> , <i>Dodonaea viscosa</i>	<i>Melaleuca ericifolia</i> , <i>Pittosporum undulatum</i>	<i>Bursaria spinosa</i> , <i>Ozothamnus diosmifolius</i> , <i>Breynia oblongifolia</i> , <i>Acacia floribunda</i> , <i>Rubus parvifolius</i> , <i>Leucopogon juniperinus</i> , <i>Olearia viscidula</i> , <i>Exocarpos cupressiformis</i> , <i>Kunzea ambigua</i> , <i>Melaleuca linariifolia</i> , <i>Hibbertia diffusa</i> , <i>Melaleuca decora</i> , <i>Acacia implexa</i> , <i>Calotis dentex</i> , <i>Trema tomentosa</i> var. <i>aspera</i> , <i>Melaleuca styphelioides</i> , <i>Myrsine variabilis</i> , <i>Polyscias sambucifolia</i> , <i>Jacksonia scoparia</i> , <i>Lissanthe strigosa</i> , <i>Melaleuca nodosa</i> , <i>Melicytus dentatus</i> , <i>Pittosporum revolutum</i> , <i>Acacia falciformis</i> , <i>Daviesia ulicifolia</i> , <i>Eremophila debilis</i> , <i>Hibbertia aspera</i> , <i>Indigofera australis</i> , <i>Leptospermum polygalifolium</i> , <i>Persoonia linearis</i> , <i>Acacia elongata</i> , <i>Acacia falcata</i> , <i>Acacia linifolia</i> , <i>Astroloma humifusum</i> , <i>Bossiaea buxifolia</i> , <i>Cassinia trinerva</i> , <i>Denhamia silvestris</i> , <i>Dillwynia sieberi</i> , <i>Dodonaea viscosa</i> , <i>Duboisia myoporoides</i> , <i>Grevillea mucronulata</i> , <i>Hakea sericea</i> , <i>Hibbertia circumdans</i> , <i>Hibbertia obtusifolia</i> , <i>Leptospermum trinervium</i> , <i>Persoonia oblongata</i> , <i>Phebalium squamulosum</i> , <i>Phyllanthus gunnii</i> , <i>Pittosporum undulatum</i> , <i>Zieria smithii</i>
	Grass	<i>Microlaena stipoides</i> , <i>Oplismenus aemulus</i> , <i>Echinopogon ovatus</i> , <i>Cynodon dactylon</i> , <i>Entolasia marginata</i> , <i>Juncus usitatus</i> , <i>Paspalidium distans</i> , <i>Aristida ramosa</i> , <i>Aristida vagans</i> , <i>Eragrostis brownii</i> , <i>Fimbristylis dichotoma</i> , <i>Rytidosperma racemosum</i> , <i>Dichelachne micrantha</i> , <i>Echinopogon caespitosus</i> , <i>Lomandra longifolia</i> , <i>Themeda triandra</i> , <i>Bothriochloa macra</i> , <i>Cyperus gracilis</i> , <i>Eragrostis leptostachya</i> , <i>Lachnagrostis filiformis</i> , <i>Chloris truncata</i> , <i>Entolasia stricta</i> , <i>Lomandra filiformis</i> , <i>Carex inversa</i> , <i>Cymbopogon refractus</i> , <i>Eriochloa pseudoacrotricha</i> , <i>Lomandra multiflora</i> subsp. <i>multiflora</i> , <i>Rytidosperma tenuius</i> , <i>Austrostipa ramosissima</i> , <i>Austrostipa verticillata</i> , <i>Carex appressa</i> , <i>Carex breviculmis</i> , <i>Chloris divaricata</i> var. <i>divaricata</i> , <i>Juncus planifolius</i> , <i>Lomandra confertifolia</i> , <i>Paspalidium albobillosum</i> , <i>Paspalidium aversum</i> , <i>Paspalum distichum</i> , <i>Rytidosperma bipartitum</i> , <i>Scleria mackaviensis</i> , <i>Sporobolus creber</i> , <i>Bolboschoenus caldwellii</i> , <i>Bothriochloa decipiens</i> var. <i>decipiens</i> , <i>Carex longebrachiata</i> , <i>Cyperus imbecillis</i> , <i>Cyperus polystachyos</i> , <i>Dichelachne rara</i> , <i>Digitaria ramularis</i> , <i>Eleocharis cylindrostachys</i> , <i>Elymus scaber</i> , <i>Eragrostis parviflora</i> , <i>Fimbristylis velata</i> , <i>Gahnia aspera</i> , <i>Isolepis inundata</i> , <i>Lachnagrostis aemula</i> , <i>Oplismenus imbecillis</i> , <i>Panicum simile</i> , <i>Sporobolus elongatus</i> , <i>Typha orientalis</i>	<i>Cynodon dactylon</i> , <i>Microlaena stipoides</i> , <i>Carex appressa</i> , <i>Elymus scaber</i> , <i>Lomandra longifolia</i> , <i>Rytidosperma racemosum</i> , <i>Austrostipa scabra</i> , <i>Juncus usitatus</i> , <i>Poa labillardierei</i> var. <i>labillardierei</i> , <i>Poa sieberiana</i> , <i>Austrostipa bigeniculata</i> , <i>Bothriochloa macra</i> , <i>Carex bichenoviana</i> , <i>Carex breviculmis</i> , <i>Cyperus lhotskyanus</i> , <i>Deyeuxia nudiflora</i> , <i>Eragrostis alveiformis</i> , <i>Juncus aridicola</i> , <i>Juncus gregiflorus</i> , <i>Juncus vaginatus</i> , <i>Lachnagrostis filiformis</i> , <i>Lomandra multiflora</i> subsp. <i>multiflora</i> , <i>Paspalidium jubiflorum</i> , <i>Phragmites australis</i> , <i>Rytidosperma caespitosum</i> , <i>Typha domingensis</i>	<i>Machaerina articulata</i> , <i>Phragmites australis</i> , <i>Cladium procerum</i> , <i>Cynodon dactylon</i> , <i>Typha orientalis</i> , <i>Bolboschoenus fluviatilis</i> , <i>Carex appressa</i> , <i>Carex brunnea</i> , <i>Carex fascicularis</i> , <i>Eleocharis acuta</i> , <i>Ficinia nodosa</i> , <i>Gahnia clarkei</i> , <i>Juncus continuus</i> , <i>Juncus mollis</i> , <i>Lachnagrostis filiformis</i> , <i>Schoenoplectus validus</i> , <i>Typha domingensis</i>	<i>Cynodon dactylon</i> , <i>Paspalum distichum</i> , <i>Typha orientalis</i> , <i>Eleocharis sphacelata</i> , <i>Juncus polyanthemus</i> , <i>Bolboschoenus caldwellii</i> , <i>Juncus usitatus</i> , <i>Carex appressa</i> , <i>Bolboschoenus fluviatilis</i> , <i>Phragmites australis</i> , <i>Cyperus odoratus</i> , <i>Eleocharis acuta</i> , <i>Juncus gregiflorus</i> , <i>Cyperus exaltatus</i> , <i>Cyperus gracilis</i> , <i>Fimbristylis velata</i> , <i>Glyceria australis</i> , <i>Isolepis inundata</i> , <i>Juncus continuus</i> , <i>Juncus planifolius</i> , <i>Lachnagrostis filiformis</i> , <i>Machaerina articulata</i> , <i>Pseudoraphis paradoxa</i> , <i>Ptilothrix deusta</i> , <i>Sporobolus virginicus</i>
	Forb	<i>Brunoniella australis</i> , <i>Dichondra repens</i> , <i>Lobelia purpurascens</i> , <i>Oxalis perennans</i> , <i>Solanum prinophyllum</i> , <i>Centella asiatica</i> , <i>Commelina cyanea</i> , <i>Dianella longifolia</i> , <i>Vernonia cinerea</i> , <i>Veronica plebeia</i> , <i>Asperula conferta</i> , <i>Einadia trigonos</i> , <i>Opercularia diphylla</i> , <i>Plectranthus parviflorus</i> , <i>Rumex brownii</i> , <i>Alternanthera denticulata</i> , <i>Eclipta platyglossa</i> , <i>Einadia hastata</i> , <i>Hypoxis hygrometrica</i> , <i>Phyllanthus virgatus</i> , <i>Wahlenbergia gracilis</i> , <i>Einadia nutans</i> , <i>Einadia polygonoides</i> , <i>Haloragis heterophylla</i> , <i>Hydrocotyle sibthorpioides</i> , <i>Poranthera microphylla</i> , <i>Sigesbeckia orientalis</i> subsp. <i>orientalis</i> , <i>Caesia parviflora</i> ,	<i>Rumex brownii</i> , <i>Geranium solanderi</i> , <i>Oxalis perennans</i> , <i>Persicaria prostrata</i> , <i>Alternanthera denticulata</i> , <i>Boerhavia dominii</i> , <i>Oxalis exilis</i> , <i>Persicaria decipiens</i> , <i>Acaena echinata</i> , <i>Alternanthera nana</i> , <i>Arthropodium minus</i> , <i>Crassula sieberiana</i> , <i>Cymbonotus lawsonianus</i> , <i>Daucus glochidiatus</i> , <i>Dichondra repens</i> , <i>Dysphania pumilio</i> , <i>Euphorbia drummondii</i> , <i>Lepidium pseudohyssopifolium</i> , <i>Lobelia concolor</i> , <i>Myriophyllum crispatum</i> , <i>Portulaca oleracea</i> , <i>Pseudognaphalium luteoalbum</i> , <i>Senecio quadridentatus</i> , <i>Veronica plebeia</i> , <i>Wahlenbergia communis</i> , <i>Wahlenbergia luteola</i> , <i>Zaleya galericulata</i>	<i>Cycnogeton procerum</i> , <i>Ludwigia peploides</i> subsp. <i>montevidensis</i> , <i>Persicaria praetermissa</i> , <i>Actites megalocarpus</i> , <i>Persicaria decipiens</i> , <i>Ranunculus amphitrichus</i> , <i>Ranunculus inundatus</i> , <i>Viola caleyana</i> , <i>Viola hederacea</i>	<i>Persicaria decipiens</i> , <i>Cycnogeton microtuberosum</i> , <i>Persicaria hydropiper</i> , <i>Ludwigia peploides</i> subsp. <i>montevidensis</i> , <i>Alternanthera denticulata</i> , <i>Ranunculus inundatus</i> , <i>Alisma plantago-aquatica</i> , <i>Cycnogeton procerum</i> , <i>Elatine gratioloides</i> , <i>Enydra woollsii</i> , <i>Potamogeton crispus</i> , <i>Cardamine paucijuga</i> , <i>Centella asiatica</i> , <i>Centipeda minima</i> subsp. <i>minima</i> , <i>Crassula helmsii</i> , <i>Damasonium minus</i> , <i>Eclipta platyglossa</i> , <i>Epilobium billardierianum</i> , <i>Gratiola pubescens</i> , <i>Hydrocotyle verticillata</i> , <i>Lemna disperma</i> , <i>Leptinella longipes</i> , <i>Liparophyllum exaltatum</i> , <i>Myriophyllum simulans</i> , <i>Myriophyllum variifolium</i> ,

Plot No		6			
Potential PCTs		4023	4088	3976	3975
		Desmodium rhytidophyllum , Dichondra sp. Inglewood , Lythrum hyssopifolia , Oxytes brachypoda , Senecio hispidulus , Tricoryne elatior , Centipeda minima subsp. minima , Cotula australis , Euchiton sphaericus , Galium gaudichaudii , Galium leiocarpum , Nyssanthes diffusa , Persicaria decipiens , Plantago debilis , Solanum pungetium , Stackhousia viminea , Ajuga australis , Alternanthera angustifolia , Alternanthera nodiflora , Argyrotegium poliochlorum , Arthropodium milleflorum , Arthropodium minus , Arthropodium sp. South-east Highlands , Brunoniella pumilio , Calotis lappulacea , Cycnogeton microtuberosum , Damasonium minus , Daucus glochidiatus , Euchiton involucratus , Galium liratum , Gonocarpus micranthus , Goodenia gracilis , Hypericum gramineum , Lobelia anceps , Mentha diemenica , Mentha satureioides , Murdannia graminea , Nicotiana suaveolens , Opercularia aspera , Oxalis exilis , Phyllanthus similis , Pseuderanthemum variabile , Pseudognaphalium luteoalbum , Ranunculus pumilio , Scaevola albida , Scutellaria humilis , Senecio diaschides , Senecio quadridentatus , Sida corrugata , Stackhousia monogyna , Trachymene incisa subsp. incisa , Triglochin striata , Verbena gaudichaudii , Vittadinia cuneata , Vittadinia sulcata , Wahlenbergia communis , Wurmbea biglandulosa			Ottelia ovalifolia subsp. ovalifolia , Persicaria orientalis , Philydrum lanuginosum , Ranunculus amphitrichus , Ruppia polycarpa , Sigesbeckia orientalis subsp. orientalis , Spirodela polyrhiza , Thyridia repens , Triglochin striata , Utricularia australis
	Fern	Cheilanthes sieberi subsp. sieberi , Cheilanthes distans , Adiantum aethiopicum , Blechnum spinulosum , Hypolepis muelleri , Marsilea hirsuta	Cheilanthes sieberi subsp. sieberi	Azolla filiculoides , Azolla pinnata , Hypolepis muelleri	Azolla pinnata , Azolla filiculoides , Marsilea hirsuta
	Other	Glycine tabacina , Desmodium varians , Parsonsia straminea , Glycine clandestina , Glycine microphylla , Clematis glycinoides , Polymeria calycina , Eustrephus latifolius , Amyema cambagei , Cayratia clematidea , Glycine tomentella , Marsdenia suaveolens , Pandorea pandorana subsp. pandorana , Smilax glyciophylla	Amyema cambagei		Amyema cambagei
Present Diagnostic Species within Study Area	Tree				
	Shrub				
	Grass	Cynodon dactylon , Bothriochloa macra , Juncus usitatus Typha orientalis	Cynodon dactylon , Bothriochloa macra , Juncus usitatus	Typha orientalis	Cynodon dactylon , Juncus usitatus Typha orientalis
	Forb	Centella asiatica , Persicaria decipiens & Rumex brownii	Lobelia concolor , Persicaria decipiens & Rumex brownii	Persicaria decipiens	Centella asiatica , Persicaria decipiens &
	Fern				
	Other	Bolboschoenus caldwellii			Bolboschoenus caldwellii , Machaerina juncea
PCT Description		A tall Casuarina open forest with a dense grassy ground layer that is found adjacent to streams or on river flats, primarily in the South Creek catchment of the Cumberland Plain to the west of Sydney and from Ellalong to north of Rothbury in the central Hunter valley. The canopy is one of the distinguishing features of this PCT, very frequently including a high cover of relatively young Casuarina glauca amongst a mix of old and young eucalypts, commonly red gums (Eucalyptus amplifolia and Eucalyptus tereticornis) or occasionally Eucalyptus moluccana. The only common species in the sparse shrub layer is Bursaria spinosa. There is a dense ground cover, typical of river flat forests, that is typically comprised of grasses, forbs, twiners and ferns.	A mid-high to tall open riverine forest with a sparse mid-stratum and a grassy ground layer found along river banks and lake margins on the alluvial floodplains of the South-west Slopes, with scattered occurrences on lower western margins of the Southern Tablelands. The canopy almost always includes Eucalyptus camaldulensis, occasionally with Casuarina cunninghamiana subsp. cunninghamiana. A shrub stratum is sparse to absent and may include occasional scattered Acacia dealbata or Kunzea ericoides. The mid-dense ground layer is dominated by grasses and forbs, commonly including Cynodon dactylon, Rumex brownii, Microlaena stipoides, Oxalis perennans, Carex appressa and Geranium solanderi, with occasional Elymus scaber, Lomandra	This placeholder PCT is defined from a small number of plots, and caution is required in the evaluation and assignment of new plots to this community. On present knowledge it may be described as a very tall sedgeland or open sedgeland occurring on the margins of low-lying closed freshwater lagoons behind coastal barrier deposits on the South Coast botanical division, usually close to sea level. The most reliable way to identify this community is by its environmental domain, as the assemblage composition is variable and at the time of description this PCT is not well sampled. On presently available information Machaerina articulata is very frequently present however sparse, while other rare to occasional sedges and rushes include Cladium	A tall to very tall freshwater sedgeland or forbland occurring in depressions on Quaternary alluvial deposits (primarily backswamps with organic-rich mud, silt or clay soils) on coastal floodplains of the Central Coast and South Coast botanical divisions. Almost all known locations occur at elevations of below 10 metres asl, however this PCT can occur at higher elevations in lagoons that have prolonged inundation, such as Ellalong Lagoon south-west of Cessnock which is just over 100 metres asl. This PCT describes non-woody freshwater wetlands on Quaternary alluvium south from the Hunter valley that are not dominated by Phragmites australis or Eleocharis equisetina and are either on low coastal

Plot No	6			
Potential PCTs	4023	4088	3976	3975
	A high cover of <i>Microlaena stipoides</i> is almost always present, with more scattered <i>Brunoniella australis</i> and <i>Dichondra repens</i> being very frequent. Common ground covers include <i>Solanum prinophyllum</i>, <i>Glycine tabacina</i>, <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>, <i>Oplismenus aemulus</i> and <i>Lobelia purpurascens</i>. It is possible that this PCT represents a successional state in a community that is re-establishing following clearing. In addition, the dominance of the salt tolerant <i>Casuarina glauca</i> may indicate saline conditions. This PCT typically occurs at elevations below 70 metres asl in a hot, dry climate. On broader floodplains of the Cumberland Plain, it grades into PCT 4025, which rarely includes <i>Casuarina glauca</i> however nevertheless has considerable floristic overlap with this PCT. Near the edge of the floodplain, it adjoins the grassy forests of either the Cumberland Plain (PCT 3320) or the Hunter valley (PCT 3315). Again, <i>Casuarina glauca</i> is rare in these PCTs.	<i>longifolia</i>, <i>Poa labillardierei</i> var. <i>labillardierei</i>, <i>Rytidosperma racemosum</i>, <i>Alternanthera denticulata</i> or <i>Juncus usitatus</i>. This PCT is sampled from the catchments of the Murray, Murrumbidgee and Lachlan rivers, from Albury north to Parkes and east to Murrumbateman and Crookwell. It occurs in warm, dry climates receiving less than 900 mm mean annual rainfall. The riverine forests of the South-west Slopes have been extensively cleared and this PCT commonly survives as small patches in an agricultural landscape. Remaining examples are frequently disturbed and subject to ongoing weed invasion and grazing pressure, and the median native species richness of the plots comprising this PCT is quite low at 13 species. This PCT is not closely related to other PCTs in eastern New South Wales. Spatially, riverine forests that also feature <i>Eucalyptus camaldulensis</i> but lack <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> occur downstream. Floodplains that are inundated less frequently and feature <i>Eucalyptus microcarpa</i> in their canopy occur nearby.	<i>procerum</i>, <i>Bolboschoenus fluviatilis</i>, species of <i>Carex</i> and <i>Juncus</i> or rarely <i>Gahnia clarkei</i>. Reeds also occur, commonly sparse <i>Phragmites australis</i> and less frequently species of <i>Typha</i> which can be relatively dense. Aquatic forbs and grasses commonly occur, and may include <i>Ludwigia peploides</i> subsp. <i>montevidensis</i>, species of <i>Azolla</i> and <i>Persicaria</i>, <i>Cynodon dactylon</i> and <i>Cynogeton procerum</i>. Occasionally mid-high trees occur, ranging from very sparse or isolated individuals of <i>Casuarina glauca</i> to dense clusters of <i>Melaleuca ericifolia</i>. Environmentally this PCT is distinguished from PCT 3963 as PCT 3976 occurs in coastal lagoons that are not permanently or intermittently open to the ocean.	floodplains or at the edges of more elevated lagoons that have prolonged inundation. Within these environmental and floristic parameters this PCT can encompass a range of sedgeland and aquatic forb assemblages. On presently available information the aquatic forb <i>Persicaria decipiens</i> is very frequently present with very sparse cover. The grasses <i>Cynodon dactylon</i> and <i>Paspalum distichum</i> and the reed <i>Typha orientalis</i> commonly occur with sparse cover, while the sedge <i>Eleocharis sphacelata</i> is occasionally present however where it does occur tends to have mid-dense cover. A diversity of other sedges, rushes and aquatic forbs are occasionally or rarely recorded, such as <i>Persicaria hydropiper</i>, <i>Cynogeton microtuberosum</i>, <i>Ludwigia peploides</i> subsp. <i>montevidensis</i>, <i>Alternanthera denticulata</i> and species of <i>Juncus</i>. Rarely, a very sparse emergent tree layer is present, which may include <i>Casuarina glauca</i>, <i>melaleucas</i> or, very rarely, overhanging <i>Eucalypts</i>. Some sedges such as <i>Machaerina articulata</i>, <i>Fimbristylis velata</i>, <i>Eleocharis acuta</i> and <i>Bolboschoenus</i> species dominate individual sites, reflecting the floristic diversity of this PCT. This community often occurs in disturbed environments and may potentially include derived states. The assessment of new non-woody freshwater wetland plots against this PCT should primarily consider environmental domain. The grassy wetland PCT 4055 also occurs on alluvium on the far South Coast, however has a much higher median elevation (known between 100 and 200 metres asl), and includes <i>Isachne globosa</i>, <i>Lachnagrostis filiformis</i>, <i>Carex gaudichaudiana</i> and <i>Cyperus sphaeroideus</i> which are all unknown or very rare in PCT 3975.
Other Diagnostic Features		Not specified	Not specified	Not specified
Vegetation Formation	Forested Wetlands;	Forested Wetlands;	Forested Wetlands;	Forested Wetlands;
Vegetation Class	Coastal Floodplain Wetlands;	Inland Riverine Forests;	Coastal Freshwater Lagoons;	Coastal Floodplain Wetlands;
Landscape Position	Not specified	Not specified	Not specified	Not specified
Elevation	19.7	154.7	1.8	0
Lithology	Not specified	Not specified	Not specified	Not specified

Plot No	6			
Potential PCTs	4023	4088	3976	3975
PCT Determination	This PCT is considered 'best fit' for the vegetation recorded within Plot 1. The vegetation on site contained the highest floristic match with this PCT along with the percentages. The PCT description describes a tall Casuarina open forest with a dense grassy ground layer that is found adjacent to streams or on river flats. While this is not an accurate depiction of the vegetation zone within this plot due to the absence of canopy species, it is noted that <i>Casuarina glauca</i> is present in other parts of the riparian area within the Subject Site. Furthermore, there is a high level of correspondence with the ground stratum species. Despite the absence of canopy species, this is an accurate depiction of the vegetation found within this vegetation zone. This PCT is considered the most accurate description of the vegetation community on site.	This PCT was considered as it was identified within the Plot to PCT Tool and because of its moderate floristic match with the vegetation zone. The vegetation zone has several corresponding species with this PCT. However, the PCT description indicates that this vegetation zone is not commensurate with this PCT, listing canopy species that are not endemic to the locality. Furthermore, this PCT is found at significantly higher elevations than that of the Subject Site. Thus, this PCT was discounted due to geographical limitations.	This PCT was considered as it was identified within the Plot to PCT Tool. Very limited diagnostic species were recorded with correlation to this PCT. Furthermore, this PCT is also not mapped under the STVM anywhere within the surrounding locality or adjoining lots to the Subject Site. It is classed as Coastal Freshwater Lagoons, at lower elevations than the Subject Site. Thus, this PCT was discounted due to its limited floristic similarities in conjunction with geographical limitations.	This PCT was considered as it was identified within the Plot to PCT Tool. Very limited diagnostic species were recorded with correlation to this PCT. Furthermore, this PCT is also not mapped under the STVM anywhere within the surrounding locality or adjoining lots to the Subject Site. It is classed as Coastal Freshwater Wetlands, at lower elevations than the Subject Site. Thus, this PCT was discounted due to its limited floristic similarities in conjunction with geographical limitations.
Result	PCT 4023 – Coastal Valleys Riparian Forest			
Estimated Cleared Value of PCT (%)	78.22%			
EEC	Listed BC Act,E: <i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i> (Part) ; This PCT is considered to be commensurate with the state listed TEC for this Subject Lands (Refer Table 12). Listed EPBC Act,E: <i>Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</i> (Part) This PCT is not considered to be commensurate with the federally listed TEC for this Subject Lands (refer Appendix I – Other legislation);			

Table iii: PCT 4023 – Poor & Lower stratum only Condition Zones

Vegetation Zones in PCT 4023	
Vegetation Zones of this PCT within Subject Site	- Poor - Lower Stratum Only
Poor Condition (Plot 1)	
Description of Vegetation Zone	Plot 1 'Severely Degraded ' condition class vegetation zone has been heavily grazed, however still produces floristically recognisable PCT composition of species. This zone has been given a 'Severely Degraded ' condition due to the low VIS score <25 provided by the BAM-C. Vegetation within this zone contains a monoculture of <i>Casuarina glauca</i> within the canopy, with an absent mid stratum and heavily grazed lower stratum (refers Plate 1 and 2), Canopy stratum: <i>Casuarina glauca</i> Mid-stratum: N/A Ground-stratum: <i>Cynodon dactylon</i>, <i>Microlaena stipoides</i>, <i>Oxalis perennans</i> & <i>Einadia nutans subsp. linifolia</i>
Area of Vegetation Zone (ha)	This vegetation zone covers approx. 15ha of the Subject Site.
Plot(s)	N/A

Vegetation Zones in PCT 4023	
 Plate 8 - PCT 4023 Poor Condition BAM Plot 1 (start)  Plate 9 - PCT 4023 Poor Condition BAM Plot 1 (end)	
Lower Stratum Only Condition (Plot 6)	
Description of Vegetation Zone	Plot 'Lower Stratum Only' condition class vegetation zones also exhibit a degraded yet similarly floristically recognisable PCT composition of species. However, these include ground cover species only. The riparian zone within the Subject Lands reflects significant disturbance, with large areas lacking canopy. However, these areas are in close proximity to areas of this PCT with canopy present. Often these areas have sustained disturbance on site, whether it be the incursion of exotic flora species and/or maintenance regimes which have disrupted the species assemblages present within each stratum as reflected in the plot data and as evidenced in the BAM Plot photos (refer Plates 3 and 4). Much of the Subject Lands has been grazed extensively, excluding the midstratum and reducing floristic diversity within the zone. Canopy stratum: Mid-stratum: Ground-stratum: <i>Cynodon dactylon</i>, <i>Typha orientalis</i>, <i>Machaerina juncea</i>, <i>Juncus usitatus</i> & <i>Bothriochloa macra</i>
Area of Vegetation Zone (ha)	0.11
Plot(s)	2 (VIS 45.3)

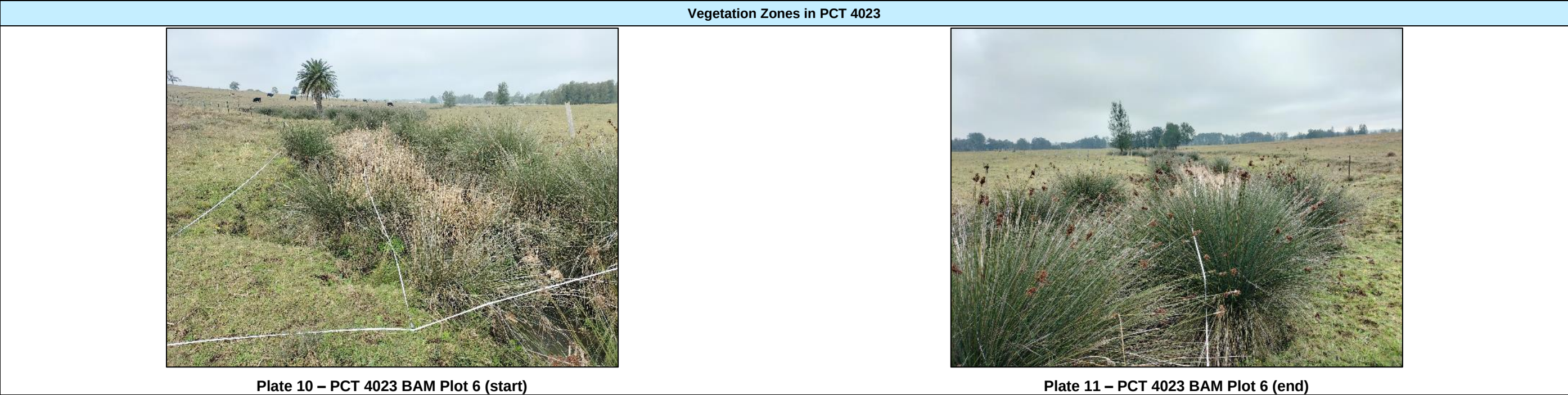


Table iv: PCT Determination for Plot 2

Plot No		2			
Potential PCTs		4089	4088	3328	3433
Regional Vegetation					
IBRA Region		Brigalow Belt South; Nandewar; Sydney Basin;	NSW South Western Slopes; South Eastern Highlands;	Sydney Basin;	NSW North Coast; Sydney Basin;
IBRA Subregion		Liverpool Plains; Peel; Hunter;	Inland Slopes; Lower Slopes; Murrumbateman;	Hunter;	Karuah Manning; Upper Hunter; Hunter; Wyong; Yengo;
IBRA Comments		Not specified	Not specified	Not specified	Not specified
NSW Landscapes		Not specified	Not specified	Not specified	Not specified
LGA		GUNNEDAH; MUSWELLBROOK; SINGLETON; TAMWORTH REGIONAL; UPPER HUNTER;	BLAYNEY; GREATER HUME SHIRE; COOTAMUNDRA-GUNDAGAI REGIONAL; NARRANDERA; SNOWY VALLEYS; UPPER LACHLAN SHIRE; WAGGA WAGGA; YASS VALLEY;	CESSNOCK; MAITLAND;	CENTRAL COAST; CESSNOCK; DUNGOG; LAKE MACQUARIE; MAITLAND; MID-COAST; NEWCASTLE; PORT STEPHENS;
Key Diagnostic Species Listed	Tree	<i>Eucalyptus camaldulensis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> , <i>Brachychiton populneus</i> , <i>Eucalyptus crebra</i> , <i>Melia azedarach</i>	<i>Eucalyptus camaldulensis</i> , <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> , <i>Acacia dealbata</i> , <i>Eucalyptus bridgesiana</i>	<i>Eucalyptus amplifolia</i> , <i>Eucalyptus canaliculata</i> <--> <i>punctata</i> , <i>Eucalyptus moluccana</i> , <i>Eucalyptus siderophloia</i> , <i>Eucalyptus tereticornis</i>	<i>Corymbia maculata</i> , <i>Eucalyptus fibrosa</i> , <i>Eucalyptus umbra</i> , <i>Eucalyptus globoidea</i> , <i>Eucalyptus punctata</i> , <i>Notelaea longifolia</i> , <i>Allocasuarina torulosa</i> , <i>Eucalyptus siderophloia</i> , <i>Eucalyptus acmenoides</i> , <i>Glochidion ferdinandi</i> , <i>Eucalyptus moluccana</i> , <i>Eucalyptus fergusonii</i> , <i>Angophora costata</i> , <i>Allocasuarina littoralis</i> , <i>Syncarpia glomulifera</i> , <i>Eucalyptus paniculata</i> , <i>Eucalyptus propinqua</i> , <i>Eucalyptus crebra</i> , <i>Acacia maidenii</i> , <i>Corymbia gummifera</i> , <i>Eucalyptus tereticornis</i> , <i>Alphitonia excelsa</i> , <i>Eucalyptus capitellata</i> , <i>Angophora floribunda</i> , <i>Eucalyptus carnea</i> , <i>Eucalyptus pilularis</i> , <i>Eucalyptus resinifera</i> , <i>Acacia parramattensis</i> , <i>Eucalyptus agglomerata</i> , <i>Eucalyptus amplifolia</i> , <i>Eucalyptus beyeriana</i> , <i>Eucalyptus canaliculata</i> , <i>Eucalyptus canaliculata</i> <--> <i>punctata</i> , <i>Eucalyptus eugenioides</i> , <i>Eucalyptus microcorys</i> , <i>Eucalyptus placita</i> , <i>Ficus rubiginosa</i> , <i>Acacia concurrens</i> , <i>Acacia decurrens</i> , <i>Acacia linearifolia</i> , <i>Acacia melanoxylon</i> , <i>Angophora</i>

Plot No		2			
Potential PCTs		4089	4088	3328	3433
					<i>bakeri</i> , <i>Brachychiton populneus</i> , <i>Clerodendrum tomentosum</i> , <i>Corymbia eximia</i> , <i>Eucalyptus robusta</i> , <i>Eucalyptus sideroxylon</i> , <i>Eucalyptus sparsifolia</i> , <i>Trochocarpa laurina</i>
	Shrub	<i>Atriplex semibaccata</i> , <i>Acacia filicifolia</i> , <i>Chenopodium auricomiforme</i> , <i>Abutilon oxycarpum</i> , <i>Acacia implexa</i> , <i>Breynia oblongifolia</i> , <i>Bursaria spinosa</i> , <i>Cassinia sifton</i> , <i>Enchylaena tomentosa</i> , <i>Exocarpos cupressiformis</i> , <i>Exocarpos strictus</i> , <i>Notelaea neglecta</i> , <i>Salsola australis</i> , <i>Sclerolaena muricata</i>	<i>Kunzea ericoides</i> , <i>Acacia deanei</i> , <i>Acacia implexa</i> , <i>Acacia rubida</i> , <i>Bursaria spinosa</i> , <i>Callistemon sieberi</i> , <i>Dodonaea viscosa</i>	<i>Bursaria spinosa</i> , <i>Breynia oblongifolia</i> , <i>Melaleuca nodosa</i> , <i>Acacia parvipinnula</i> , <i>Denhamia silvestris</i> , <i>Hakea sericea</i> , <i>Leucopogon juniperinus</i> , <i>Melaleuca linariifolia</i> , <i>Melaleuca styphelioides</i> , <i>Abutilon oxycarpum</i> , <i>Callistemon pinifolius</i> , <i>Cassinia uncata</i> , <i>Eremophila debilis</i> , <i>Exocarpos strictus</i> , <i>Hibbertia diffusa</i> , <i>Hibbertia pedunculata</i> , <i>Jacksonia scoparia</i> , <i>Leptospermum polygalifolium</i> , <i>Melaleuca decora</i> , <i>Melichrus urceolatus</i> , <i>Pittosporum undulatum</i> , <i>Poranthera corymbosa</i> , <i>Styphelia triflora</i> , <i>Trema tomentosa</i> var. <i>aspera</i>	<i>Daviesia ulicifolia</i> , <i>Bursaria spinosa</i> , <i>Persoonia linearis</i> , <i>Pultenaea villosa</i> , <i>Leucopogon juniperinus</i> , <i>Phyllanthus hirtellus</i> , <i>Acacia ulicifolia</i> , <i>Acacia falcata</i> , <i>Breynia oblongifolia</i> , <i>Melaleuca nodosa</i> , <i>Hibbertia aspera</i> , <i>Denhamia silvestris</i> , <i>Exocarpos cupressiformis</i> , <i>Ozothamnus diosmifolius</i> , <i>Acacia irrorata</i> , <i>Dillwynia retorta</i> , <i>Lissanthe strigosa</i> , <i>Acacia elongata</i> , <i>Acacia longifolia</i> , <i>Pultenaea euchila</i> , <i>Acacia parvipinnula</i> , <i>Dodonaea triquetra</i> , <i>Podolobium scandens</i> , <i>Cassinia uncata</i> , <i>Hibbertia pedunculata</i> , <i>Leptospermum polygalifolium</i> , <i>Callistemon linearis</i> , <i>Melaleuca decora</i> , <i>Melaleuca styphelioides</i> , <i>Podolobium ilicifolium</i> , <i>Polyscias sambucifolia</i> , <i>Acrotriche divaricata</i> , <i>Hibbertia empetrifolia</i> subsp. <i>empetrifolia</i> , <i>Acacia implexa</i> , <i>Hibbertia diffusa</i> , <i>Pultenaea retusa</i> , <i>Callistemon salignus</i> , <i>Daviesia squarrosa</i> , <i>Pimelea linifolia</i> , <i>Acacia fimbriata</i> , <i>Epacris pulchella</i> , <i>Grevillea montana</i> , <i>Hibbertia obtusifolia</i> , <i>Indigofera australis</i> , <i>Jacksonia scoparia</i> , <i>Pittosporum revolutum</i> , <i>Pittosporum undulatum</i> , <i>Podolobium aciculiferum</i> , <i>Pultenaea spinosa</i> , <i>Exocarpos strictus</i> , <i>Grevillea linearifolia</i> , <i>Hakea sericea</i> , <i>Leptospermum trinervium</i> , <i>Leucopogon lanceolatus</i> , <i>Melaleuca linariifolia</i> , <i>Acacia brownii</i> , <i>Acacia linifolia</i> , <i>Acacia stricta</i> , <i>Banksia spinulosa</i> , <i>Callistemon rigidus</i> , <i>Eremophila debilis</i> , <i>Hibbertia vestita</i> , <i>Melaleuca thymifolia</i> , <i>Mirbelia rubiifolia</i> , <i>Pittosporum multiflorum</i> , <i>Platysace ericoides</i> , <i>Pultenaea myrtoides</i> , <i>Pultenaea paleacea</i> , <i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i> , <i>Acacia myrtifolia</i> , <i>Acacia obliquinervia</i> , <i>Bossiaea obcordata</i> , <i>Callistemon linearifolius</i> , <i>Cassinia quinquefaria</i> , <i>Cassinia sifton</i> , <i>Chorizema parviflorum</i> , <i>Daviesia umbellulata</i> , <i>Dillwynia phyllicoides</i> , <i>Gompholobium latifolium</i> , <i>Goodenia ovata</i> , <i>Leptospermum polyanthum</i> , <i>Melaleuca sieberi</i> , <i>Monotoca scoparia</i> , <i>Myrsine variabilis</i> , <i>Notelaea ovata</i> , <i>Notelaea venosa</i> , <i>Pultenaea flexilis</i> , <i>Sannantha pluriflora</i> , <i>Solanum stelligerum</i> , <i>Styphelia triflora</i> , <i>Acacia floribunda</i> , <i>Acacia longissima</i> , <i>Acacia mearnsii</i> , <i>Acacia suaveolens</i> , <i>Acacia terminalis</i> , <i>Backhousia myrtifolia</i> , <i>Bossiaea rhombifolia</i> , <i>Callistemon pachyphyllus</i> , <i>Callistemon pinifolius</i> , <i>Comesperma defoliatum</i> , <i>Correa reflexa</i> , <i>Crowea exalata</i> , <i>Dillwynia sp. trichopoda</i> , <i>Dodonaea viscosa</i> , <i>Gompholobium inconspicuum</i> , <i>Gompholobium minus</i> , <i>Gompholobium pinnatum</i> , <i>Hibbertia linearis</i> , <i>Hibbertia riparia</i> , <i>Hibbertia serpyllifolia</i> , <i>Hovea lanceolata</i> , <i>Kunzea ambigua</i> , <i>Kunzea ericoides</i> , <i>Leptospermum brevipes</i> , <i>Leptospermum juniperinum</i> , <i>Leucopogon ericoides</i> , <i>Logania albiflora</i> , <i>Lomatia silaifolia</i> , <i>Melaleuca erubescens</i> , <i>Melichrus urceolatus</i> , <i>Myrsine howittiana</i> , <i>Olearia microphylla</i> , <i>Olearia tomentosa</i> , <i>Persoonia levis</i> , <i>Phebalium squamulosum</i> , <i>Phyllanthus gunnii</i> , <i>Phyllota phyllicoides</i> , <i>Pimelea latifolia</i> subsp. <i>hirsuta</i> , <i>Platylobium formosum</i> , <i>Pomaderris ferruginea</i> , <i>Poranthera corymbosa</i> , <i>Pultenaea ferruginea</i> , <i>Pultenaea rosmarinifolia</i> , <i>Pultenaea subspicata</i> ,

Plot No		2			
Potential PCTs		4089	4088	3328	3433
					<i>Pultenaea villifera</i> , <i>Sannantha similis</i> , <i>Solanum brownii</i> , <i>Solanum cinereum</i> , <i>Xylomelum pyriforme</i> , <i>Zieria smithii</i>
	Grass	<i>Cynodon dactylon</i> , <i>Austrostipa verticillata</i> , <i>Paspalidium constrictum</i> , <i>Paspalidium distans</i> , <i>Dichanthium sericeum</i> , <i>Juncus usitatus</i> , <i>Austrostipa setacea</i> , <i>Carex appressa</i> , <i>Eriochloa procera</i> , <i>Juncus continuus</i> , <i>Lomandra confertifolia</i> , <i>Oplismenus imbecillis</i> , <i>Paspalidium jubiflorum</i> , <i>Rytidosperma bipartitum</i>	<i>Cynodon dactylon</i> , <i>Microlaena stipoides</i> , <i>Carex appressa</i> , <i>Elymus scaber</i> , <i>Lomandra longifolia</i> , <i>Rytidosperma racemosum</i> , <i>Austrostipa scabra</i> , <i>Juncus usitatus</i> , <i>Poa labillardierei</i> var. <i>labillardierei</i> , <i>Poa sieberiana</i> , <i>Austrostipa bigeniculata</i> , <i>Bothriochloa macra</i> , <i>Carex bichenoviana</i> , <i>Carex breviculmis</i> , <i>Cyperus lhotskyanus</i> , <i>Deyeuxia nudiflora</i> , <i>Eragrostis alveiformis</i> , <i>Juncus aridicola</i> , <i>Juncus gregiflorus</i> , <i>Juncus vaginatus</i> , <i>Lachnagrostis filiformis</i> , <i>Lomandra multiflora</i> subsp. <i>multiflora</i> , <i>Paspalidium jubiflorum</i> , <i>Phragmites australis</i> , <i>Rytidosperma caespitosum</i> , <i>Typha domingensis</i>	<i>Microlaena stipoides</i> , <i>Themeda triandra</i> , <i>Aristida ramosa</i> , <i>Cymbopogon refractus</i> , <i>Cynodon dactylon</i> , <i>Cyperus gracilis</i> , <i>Echinopogon ovatus</i> , <i>Lomandra confertifolia</i> , <i>Aristida vagans</i> , <i>Entolasia stricta</i> , <i>Imperata cylindrica</i> , <i>Paspalidium distans</i> , <i>Sporobolus creber</i> , <i>Carex inversa</i> , <i>Cyperus fulvus</i> , <i>Dichelachne micrantha</i> , <i>Digitaria diffusa</i> , <i>Echinopogon caespitosus</i> , <i>Entolasia marginata</i> , <i>Fimbristylis dichotoma</i> , <i>Juncus homalocaulis</i> , <i>Juncus subsecundus</i> , <i>Juncus usitatus</i> , <i>Lomandra longifolia</i> , <i>Oplismenus imbecillis</i> , <i>Panicum simile</i> , <i>Rytidosperma monticola</i> , <i>Sporobolus diander</i>	<i>Entolasia stricta</i> , <i>Microlaena stipoides</i> , <i>Aristida vagans</i> , <i>Themeda triandra</i> , <i>Lomandra multiflora</i> subsp. <i>multiflora</i> , <i>Lepidosperma laterale</i> , <i>Panicum simile</i> , <i>Lomandra filiformis</i> , <i>Imperata cylindrica</i> , <i>Cymbopogon refractus</i> , <i>Lomandra longifolia</i> , <i>Paspalidium distans</i> , <i>Dichelachne micrantha</i> , <i>Eragrostis brownii</i> , <i>Lomandra confertifolia</i> , <i>Rytidosperma pallidum</i> , <i>Echinopogon caespitosus</i> , <i>Echinopogon ovatus</i> , <i>Poa labillardierei</i> var. <i>labillardierei</i> , <i>Ptilothrix deusta</i> , <i>Digitaria ramularis</i> , <i>Entolasia marginata</i> , <i>Lomandra obliqua</i> , <i>Rytidosperma tenuius</i> , <i>Rytidosperma fulvum</i> , <i>Digitaria parviflora</i> , <i>Fimbristylis dichotoma</i> , <i>Lomandra glauca</i> , <i>Aristida ramosa</i> , <i>Aristida warburgii</i> , <i>Eragrostis leptostachya</i> , <i>Gahnia aspera</i> , <i>Gahnia radula</i> , <i>Poa affinis</i> , <i>Anisopogon avenaceus</i> , <i>Oplismenus imbecillis</i> , <i>Carex inversa</i> , <i>Lomandra cylindrica</i> , <i>Panicum effusum</i> , <i>Poa sieberiana</i> , <i>Rytidosperma longifolium</i> , <i>Rytidosperma setaceum</i> , <i>Cynodon dactylon</i> , <i>Juncus usitatus</i> , <i>Oplismenus aemulus</i> , <i>Schoenus apogon</i> , <i>Digitaria diffusa</i> , <i>Lepidosperma gunnii</i> , <i>Austrostipa pubescens</i> , <i>Austrostipa scabra</i> , <i>Carex breviculmis</i> , <i>Cyperus gracilis</i> , <i>Deyeuxia quadriseta</i> , <i>Dichelachne crinita</i> , <i>Dichelachne inaequiglumis</i> , <i>Dichelachne rara</i> , <i>Gahnia clarkei</i> , <i>Juncus remotiflorus</i> , <i>Juncus subsecundus</i> , <i>Lepidosperma concavum</i> , <i>Paspalidium albopilosum</i> , <i>Rytidosperma caespitosum</i> , <i>Sporobolus creber</i> , <i>Aristida queenslandica</i> var. <i>queenslandica</i> , <i>Austrostipa ramosissima</i> , <i>Austrostipa setacea</i> , <i>Austrostipa verticillata</i> , <i>Bothriochloa decipiens</i> var. <i>decipiens</i> , <i>Bothriochloa macra</i> , <i>Capillipedium parviflorum</i> , <i>Capillipedium spicigerum</i> , <i>Carex appressa</i> , <i>Carex longibrachiata</i> , <i>Cyathochaeta diandra</i> , <i>Cyperus enervis</i> , <i>Cyperus laevis</i> , <i>Cyperus polystachyos</i> , <i>Dichelachne parva</i> , <i>Dichelachne sieberiana</i> , <i>Digitaria breviglumis</i> , <i>Digitaria didactyla</i> , <i>Eragrostis elongata</i> , <i>Eragrostis sororia</i> , <i>Gahnia melanocarpa</i> , <i>Gahnia sieberiana</i> , <i>Hemarthria uncinata</i> , <i>Isolepis cernua</i> , <i>Juncus continuus</i> , <i>Lachnagrostis aemula</i> , <i>Lachnagrostis filiformis</i> , <i>Lepidosperma elatius</i> , <i>Lepyrodia anarthria</i> , <i>Lomandra micrantha</i> subsp. <i>tuberculata</i> , <i>Luzula flaccida</i> , <i>Panicum decompositum</i> , <i>Panicum pygmaeum</i> , <i>Panicum queenslandicum</i> , <i>Paspalidium aversum</i> , <i>Paspalidium criniforme</i> , <i>Paspalum distichum</i> , <i>Paspalum orbiculare</i> , <i>Rytidosperma indutum</i> , <i>Schoenus ericetorum</i> , <i>Scleria mackaviensis</i> , <i>Sorghum leiocladum</i> , <i>Sporobolus caroli</i> , <i>Sporobolus elongatus</i> , <i>Tetraria capillaris</i>
	Forb	<i>Rumex brownii</i> , <i>Urtica incisa</i> , <i>Alternanthera denticulata</i> , <i>Einadia hastata</i> , <i>Einadia nutans</i> , <i>Oxalis perennans</i> , <i>Boerhavia dominii</i> , <i>Commelina cyanea</i> , <i>Einadia trigonos</i> , <i>Lepidium pseudohyssopifolium</i> , <i>Lobelia concolor</i> , <i>Alternanthera</i> sp. A , <i>Dichondra repens</i> , <i>Lobelia purpurascens</i> , <i>Oxalis radicata</i> , <i>Sida corrugata</i> , <i>Ajuga australis</i> , <i>Chrysocephalum apiculatum</i> , <i>Dysphania pumilio</i> , <i>Einadia polygonoides</i> , <i>Euphorbia dallachyana</i> , <i>Haloragis serra</i> , <i>Plantago varia</i> , <i>Portulaca</i>	<i>Rumex brownii</i> , <i>Geranium solanderi</i> , <i>Oxalis perennans</i> , <i>Persicaria prostrata</i> , <i>Alternanthera denticulata</i> , <i>Boerhavia dominii</i> , <i>Oxalis exilis</i> , <i>Persicaria decipiens</i> , <i>Acaena echinata</i> , <i>Alternanthera nana</i> , <i>Arthropodium minus</i> , <i>Crassula sieberiana</i> , <i>Cymbonotus lawsonianus</i> , <i>Daucus glochidiatus</i> , <i>Dichondra repens</i> , <i>Dysphania pumilio</i> , <i>Euphorbia drummondii</i> , <i>Lepidium pseudohyssopifolium</i> , <i>Lobelia concolor</i> , <i>Myriophyllum crispatum</i> , <i>Portulaca oleracea</i> , <i>Pseudognaphalium</i>	<i>Lobelia purpurascens</i> , <i>Oxalis perennans</i> , <i>Commelina cyanea</i> , <i>Dichondra repens</i> , <i>Veronica plebeia</i> , <i>Asperula conferta</i> , <i>Brunoniella australis</i> , <i>Centella asiatica</i> , <i>Dianella revoluta</i> , <i>Dianella tasmanica</i> , <i>Laxmannia gracilis</i> , <i>Pomax umbellata</i> , <i>Vernonia cinerea</i> , <i>Dianella caerulea</i> , <i>Dianella longifolia</i> , <i>Eclipta platyglossa</i> , <i>Einadia hastata</i> , <i>Euchiton involucratus</i> , <i>Goodenia hederacea</i> , <i>Hydrocotyle laxiflora</i> , <i>Hypoxis hygrometrica</i> , <i>Lagenophora stipitata</i> , <i>Murdannia</i>	<i>Lobelia purpurascens</i> , <i>Dianella caerulea</i> , <i>Brunoniella australis</i> , <i>Vernonia cinerea</i> , <i>Dianella revoluta</i> , <i>Opercularia diphylla</i> , <i>Goodenia heterophylla</i> , <i>Lagenophora stipitata</i> , <i>Desmodium rhytidophyllum</i> , <i>Gonocarpus tetragynus</i> , <i>Dichondra repens</i> , <i>Pomax umbellata</i> , <i>Pseuderanthemum variabile</i> , <i>Oxalis perennans</i> , <i>Boronia polygalifolia</i> , <i>Goodenia rotundifolia</i> , <i>Hypericum gramineum</i> , <i>Acianthus fornicatus</i> , <i>Desmodium gunnii</i> , <i>Arthropodium</i>

Plot No		2			
Potential PCTs		4089	4088	3328	3433
		oleracea , Senna barclayana , Sida cunninghamii , Solanum opacum , Solanum prinophyllum , Tribulus minutus , Tricoryne elatior	luteoalbum , Senecio quadridentatus , Veronica plebeia , Wahlenbergia communis , Wahlenbergia luteola , Zaleya galericulata	graminea , Opercularia aspera , Phyllanthus virgatus , Plantago gaudichaudii , Poranthera microphylla , Pseuderanthemum variabile , Solanum prinophyllum	milleflorum , Dianella longifolia , Tricoryne elatior , Caesia parviflora , Caladenia catenata , Dianella tasmanica , Goodenia hederacea , Arthropodium sp. South-east Highlands , Chrysocephalum apiculatum , Laxmannia gracilis , Brachyscome multifida , Centella asiatica , Solanum prinophyllum , Vittadinia cuneata , Arthropodium minus , Brunoniella pumilio , Euchiton sphaericus , Galium binifolium , Gonocarpus teucrioides , Goodenia bellidifolia , Hypoxis hygrometrica , Veronica plebeia , Viola betonicifolia , Wahlenbergia communis , Bossiaea prostrata , Hydrocotyle laxiflora , Opercularia aspera , Opercularia varia , Oxalis exilis , Wahlenbergia gracilis , Drosera peltata , Euchiton involucratus , Lagenophora gracilis , Logania pusilla , Poranthera microphylla , Stackhousia viminea , Stylidium graminifolium , Brachyscome angustifolia , Commelina cyanea , Galium gaudichaudii , Galium leiocarpum , Goodenia paniculata , Murdannia graminea , Opercularia hispida , Oxytes brachypoda , Patersonia glabrata , Plantago debilis , Pterostylis longifolia , Thysanotus tuberosus , Alternanthera denticulata , Brachyscome microcarpa , Caladenia carnea , Calochilus robertsonii , Chrysocephalum semipapposum , Dichondra sp. Inglewood , Drosera auriculata , Einadia hastata , Einadia nutans , Haloragis heterophylla , Hovea linearis , Hybanthus monopetalus , Hybanthus stellarioides , Hydrocotyle sibthorpioides , Hydrocotyle tripartita , Plectranthus parviflorus , Pterostylis acuminata , Pterostylis nutans , Senecio pinnatifolius , Sigesbeckia orientalis subsp. orientalis , Tricoryne simplex , Wurmbea biglandulosa , Acianthus collinus , Acianthus pusillus , Ajuga australis , Arrhenechthites mixta , Boronia parviflora , Brachyscome dissectifolia , Brachyscome graminea , Brunonia australis , Burchardia umbellata , Caladenia fuscata , Calotis cuneifolia , Calotis lappulacea , Chiloglottis diphylla , Coopernookia barbata , Coronidium scorpioides , Corybas aconitiflorus , Cotula australis , Craspedia variabilis , Cynoglossum australe , Dampiera stricta , Daucus glochidiatus , Dianella prunina , Dipodium punctatum , Eclipta platyglossa , Einadia trigonos , Eriochilus cucullatus , Euchiton japonicus , Geranium homeanum , Haemodorum planifolium , Hypericum japonicum , Lyperanthus suaveolens , Microtis unifolia , Patersonia sericea , Phyllanthus virgatus , Polygala japonica , Pterostylis alveata , Pterostylis concinna , Pterostylis erecta , Rutidosia heterogama , Senecio hispidulus , Senecio prenanthoides , Senecio quadridentatus , Senecio vagus , Solenogyne bellioides , Spiranthes australis , Stackhousia monogyna , Tephrosia brachyodon , Thelionema caespitosum , Thelymitra pauciflora , Veronica calycina , Viola hederacea , Vittadinia cervicalaris , Vittadinia sulcata , Wahlenbergia littoricola , Wahlenbergia stricta , Zornia dyctiocarpa var. dyctiocarpa
	Fern	Marsilea drummondii , Cheilanthes austrotenuifolia	Cheilanthes sieberi subsp. sieberi	Cheilanthes sieberi subsp. sieberi , Adiantum aethiopicum	Cheilanthes sieberi subsp. sieberi , Lindsaea microphylla , Pteridium esculentum , Cheilanthes austrotenuifolia , Adiantum aethiopicum , Asplenium flabellifolium , Botrychium australe , Cheilanthes

Plot No		2			
Potential PCTs		4089	4088	3328	3433
					<i>distans</i> , <i>Cheilanthes lasiophylla</i> , <i>Hypolepis muelleri</i> , <i>Pellaea falcata</i>
	Other	<i>Glycine clandestina</i> , <i>Convolvulus erubescens</i>	<i>Amyema cambagei</i>	<i>Glycine tabacina</i> , <i>Glycine clandestina</i> , <i>Amyema gaudichaudii</i> , <i>Cassytha glabella</i> , <i>Desmodium varians</i> , <i>Glycine tomentella</i> , <i>Kennedia rubicunda</i>	<i>Glycine clandestina</i> , <i>Hardenbergia violacea</i> , <i>Billardiera scandens</i> , <i>Eustrephus latifolius</i> , <i>Glycine tabacina</i> , <i>Pandorea pandorana</i> subsp. <i>pandorana</i> , <i>Dendrophthoe vitellina</i> , <i>Geitonoplesium cymosum</i> , <i>Parsonsia straminea</i> , <i>Polymeria calycina</i> , <i>Cassytha glabella</i> , <i>Desmodium varians</i> , <i>Glycine microphylla</i> , <i>Macrozamia communis</i> , <i>Cassytha pubescens</i> , <i>Macrozamia flexuosa</i> , <i>Xanthorrhoea macronema</i> , <i>Clematis glycinoides</i> , <i>Kennedia rubicunda</i> , <i>Clematis aristata</i> , <i>Convolvulus erubescens</i> , <i>Hibbertia scandens</i> , <i>Xanthorrhoea latifolia</i> , <i>Cissus antarctica</i> , <i>Cissus hypoglauca</i> , <i>Glycine tomentella</i> , <i>Smilax australis</i> , <i>Xanthorrhoea fulva</i> , <i>Xanthorrhoea resinosa</i> , <i>Amyema pendula</i> , <i>Amyema quandang</i> , <i>Calochlaena dubia</i> , <i>Cayratia clematidea</i> , <i>Dendrobium aemulum</i> , <i>Glycine canescens</i> , <i>Gynochthodes jasminoides</i> , <i>Jasminum volubile</i> , <i>Livistona australis</i> , <i>Macrozamia spiralis</i> , <i>Parsonsia lanceolata</i> , <i>Smilax glyciophylla</i> , <i>Stephania japonica</i> var. <i>discolor</i> , <i>Xanthorrhoea glauca</i> , <i>Xanthorrhoea minor</i>
Present Diagnostic Species within Study Area	Tree				
	Shrub			<i>Hakea sericea</i>	<i>Hakea sericea</i>
	Grass	<i>Cynodon dactylon</i>	<i>Cynodon dactylon</i> , <i>Microlaena stipoides</i>	<i>Cynodon dactylon</i> , <i>Aristida vagans</i> , <i>Cymbopogon refractus</i> & <i>Microlaena stipoides</i>	<i>Cynodon dactylon</i> , <i>Aristida vagans</i> , <i>Cymbopogon refractus</i> , <i>Eragrostis elongate</i> , <i>Microlaena stipoides</i> & <i>Sporobolus creber</i>
	Forb				
	Fern				
	Other				
PCT Description		A very tall sclerophyll and Casuarina Forest to open forest or woodland with a mid-stratum that is absent or sparse and a grassy ground layer, found on alluvial floodplains of the upper Hunter and Namoi river catchments. The canopy almost always includes <i>Eucalyptus camaldulensis</i> , rarely with <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> . There is usually no mid-stratum in this PCT. The dense ground layer is mainly comprised of grasses and forbs, almost always including <i>Cynodon dactylon</i> with high cover, and occasionally <i>Rumex brownii</i> , <i>Alternanthera denticulata</i> , <i>Austrostipa verticillata</i> , <i>Urtica incisa</i> and <i>Paspalidium constrictum</i> . This PCT primarily occurs along the Hunter River and its tributaries between Singleton and Scone, and tributaries of the Namoi River around Gunnedah and Tamworth including the Peel and Mooki rivers. This PCT occurs in hot, dry climates receiving less than 650 mm mean annual rainfall. The riverine forests in this region have been extensively cleared and this PCT occurs in small patches in an agricultural landscape. Surviving patches are frequently disturbed and subject to ongoing weed invasion and grazing pressure. The median native species richness of the plots comprising this PCT is less than ten species, which is lower than comparable riverine PCTs. In the Hunter catchment, the riverine forest PCT 4073 which includes <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> however lacks	A mid-high to tall open riverine forest with a sparse mid-stratum and a grassy ground layer found along river banks and lake margins on the alluvial floodplains of the South-west Slopes, with scattered occurrences on lower western margins of the Southern Tablelands. The canopy almost always includes <i>Eucalyptus camaldulensis</i> , occasionally with <i>Casuarina cunninghamiana</i> subsp. <i>cunninghamiana</i> . A shrub stratum is sparse to absent and may include occasional scattered <i>Acacia dealbata</i> or <i>Kunzea ericoides</i> . The mid-dense ground layer is dominated by grasses and forbs, commonly including <i>Cynodon dactylon</i> , <i>Rumex brownii</i> , <i>Microlaena stipoides</i> , <i>Oxalis perennans</i> , <i>Carex appressa</i> and <i>Geranium solanderi</i> , with occasional <i>Elymus scaber</i> , <i>Lomandra longifolia</i> , <i>Poa labillardierei</i> var. <i>labillardierei</i> , <i>Rytidosperma racemosum</i> , <i>Alternanthera denticulata</i> or <i>Juncus usitatus</i> . This PCT is sampled from the catchments of the Murray, Murrumbidgee and Lachlan rivers, from Albury north to Parkes and east to Murrumbateman and Crookwell. It occurs in warm, dry climates receiving less than 900 mm mean annual rainfall. The riverine forests of the South-west Slopes have been extensively cleared and this PCT commonly survives as small patches in an agricultural landscape. Remaining examples are frequently disturbed and subject to ongoing weed invasion and grazing pressure, and the median native species richness of the plots	A tall to very tall sclerophyll open forest with a sub-canopy of <i>Melaleuca</i> trees and a grassy ground layer found on low-lying alluvial soils in the lower Hunter valley. The tree canopy very frequently includes a high cover of <i>Eucalyptus amplifolia</i> which is rarely replaced by <i>Eucalyptus tereticornis</i> . Other rarely occurring eucalypts include <i>Eucalyptus moluccana</i> , hybrid <i>Eucalyptus canaliculata</i> - <i>punctata</i> , or <i>Eucalyptus siderophloia</i> . The mid-stratum is characterised by a sparse to mid-dense cover of mid-high <i>Melaleuca</i> trees, including commonly, <i>Melaleuca nodosa</i> , occasionally <i>Melaleuca linariifolia</i> and <i>Melaleuca styphelioides</i> and rarely <i>Melaleuca decora</i> . A lower layer of shrubs very frequently includes <i>Bursaria spinosa</i> , commonly <i>Breynia oblongifolia</i> or occasionally <i>Acacia parvipinnula</i> . The ground layer has a mid-dense to dense and diverse cover of grasses, forbs, twiners and small ferns. <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> is almost always present, very frequently with <i>Microlaena stipoides</i> , <i>Oxalis perennans</i> , <i>Glycine tabacina</i> , <i>Themeda triandra</i> and <i>Lobelia purpurascens</i> , commonly with <i>Aristida ramosa</i> and <i>Cymbopogon refractus</i> . This PCT occurs in drier and warmer environments than coastal river flat eucalypt forests to the east (PCT 4042) which share some structural and species characteristics, however have more mesophyll species because of the higher	A tall to very tall sclerophyll open forest with dry and soft-leaved shrubs and a grassy ground cover on undulating foothills of the Hunter coast hinterland from Tuggerah to Stratford, and the lower Hunter valley around Cessnock. The canopy almost always includes <i>Corymbia maculata</i> accompanied by one or more ironbarks (<i>Eucalyptus fibrosa</i> or <i>Eucalyptus siderophloia</i>). Mahoganies (<i>Eucalyptus umbra</i> or <i>Eucalyptus acmenoides</i>) are also commonly present in the canopy. The sparse mid-stratum almost always includes one or more <i>Acacia</i> species, of which <i>Acacia falcata</i> and <i>Acacia ulicifolia</i> are the most frequent and abundant. The shrubs and small trees that complete the mid-stratum very frequently include <i>Daviesia ulicifolia</i> , commonly <i>Bursaria spinosa</i> , <i>Persoonia linearis</i> and rarely <i>Pultenaea villosa</i> , <i>Leucopogon juniperinus</i> or patches of <i>Melaleuca nodosa</i> . The mid-dense ground layer typically includes graminoids, forbs, twiners and a hardy fern. <i>Entolasia stricta</i> is almost always present, with <i>Themeda triandra</i> , <i>Lobelia purpurascens</i> , <i>Microlaena stipoides</i> , <i>Aristida vagans</i> , <i>Lomandra multiflora</i> subsp. <i>multiflora</i> , <i>Glycine clandestina</i> and <i>Cheilanthes sieberi</i> subsp. <i>sieberi</i> all very frequent. This PCT occurs primarily on Permian sediments, however is also present on claystones of the Narrabeen Group. It is commonly recorded at elevations below 150 metres asl, with scattered

Plot No	2			
Potential PCTs	4089	4088	3328	3433
	Eucalyptus camaldulensis is present in reasonably close proximity to this PCT. In the Namoi catchment, riverine forests that also include Eucalyptus camaldulensis, however lack Casuarina cunninghamiana subsp. cunninghamiana generally occur downstream of this PCT.	comprising this PCT is quite low at 13 species. This PCT is not closely related to other PCTs in eastern New South Wales. Spatially, riverine forests that also feature Eucalyptus camaldulensis but lack Casuarina cunninghamiana subsp. cunninghamiana occur downstream. Floodplains that are inundated less frequently and feature Eucalyptus microcarpa in their canopy occur nearby.	rainfall. It occurs on creek-lines draining low-elevation Permian sediments, generally at elevations of less than 130 metres asl and is currently restricted to small isolated remnants, or narrow creek flats in larger patches in the Cessnock district. Native vegetation on alluvial soils in the region has been depleted and current remnants are likely to represent a small proportion of the original extent in the wider lower Hunter valley.	records up to 300 metres asl, in a moist climate with a mean annual rainfall of 1030 mm. As rainfall decreases in adjacent areas this PCT grades into PCT 3444, with considerable spatial overlap occurring in the Cessnock area. While this PCT has a higher frequency of mahogany eucalypts and melaleucas than PCT 3444, there is considerable overlap in the assemblage of both PCTs. On coastal foothills it grades into PCT 3432 which is characterised by different canopy species such as Angophora costata and Corymbia gummifera.
Other Diagnostic Features		Not specified	Not specified	Not specified
Vegetation Formation	Forested Wetlands;	Forested Wetlands;	Grassy Woodlands;	Dry Sclerophyll Forests (Shrub/grass sub-formation);
Vegetation Class	Inland Riverine Forests;	Inland Riverine Forests;	Coastal Valley Grassy Woodlands;	Hunter-Macleay Dry Sclerophyll Forests;
Landscape Position	Not specified	Not specified	Not specified	Not specified
Elevation	34.2	154.7	13.4	10.2
Lithology	Not specified	Not specified	Not specified	Not specified
PCT Determination	This PCT was considered due to its identification within the plot to PCT tool. However, this PCT is not considered to be an accurate representation of the vegetation zone due to several key limiting factors. There is little to no correlation between the vegetation assemblages for this PCT and those observed within the vegetation zone. Furthermore, there were similar limitations identified within the vegetation description, formation, class and elevation. As such, this is not considered to be the PCT of best fit.	This PCT was identified by the plot to PCT determination tool as a matching PCT for this vegetation zone. However, this PCT is not considered to be an accurate representation of the vegetation zone. correlation between the vegetation assemblages for this PCT and those observed within the vegetation zone. Furthermore, there were similar limitations identified within the vegetation description, formation, class and elevation. As such, this is not considered to be the PCT of best fit.	This PCT was considered due to its moderate floristic similarities with species recorded in the plot data as well as its identification by the plot to PCT tool as a matching PCT for this vegetation zone. The floristic similarities are high in comparison with the aforementioned PCTs. However, the absence of several key diagnostic species within the locality, such as <i>Melaleuca sp</i> indicates that this PCT is not considered to be the best match.	This PCT was considered because of floristic similarities with species identified on site and in the surrounding area, as well as the close proximity of the Subject Lands to STVM of this PCT. This PCT has the greatest correlation within vegetation assemblages in this vegetation zone. The PCT description depicts geographical ranges that corresponds with the location of the Subject Site. Furthermore, several of the key diagnostic species are known to be present within the locality. Therefore, this PCT is considered to be the best match for this vegetation zone.
Result	PCT 3433 – Coastal Valleys Riparian Forest			
Estimated Cleared Value of PCT (%)	68.6%			
EEC	Listed BC Act,E: <i>Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions</i> (Part) ; This PCT is notconsidered to be commensurate with the state listed TEC for this Subject Site.			

Table v: PCT 3433– Severely Degraded

Vegetation Zones in PCT 3433	
Vegetation Zones of this PCT within Subject Site	Severely Degraded
Severely Degraded Condition (Plot 2)	
Description of Vegetation Zone	Plot 2 'Severely Degraded ' condition class vegetation zone has been heavily grazed, however still produces some floristically recognisable PCT composition of species. This zone has been given a 'Severely Degraded ' condition due to the low VIS score <25 provided by the BAM-C. Vegetation within this zone is limited to sparse incidences of <i>Hakea sericea</i> (refers Plate 1 and 2), and lower-stratum dominated by exotic species <i>Axonopus fissifolius</i> and planted native <i>Cynodon dactylon</i>. Canopy stratum: Mid-stratum: <i>Hakea sericea</i> Ground-stratum: <i>Cynodon dactylon</i>, <i>Aristida vagans</i>, <i>Cymbopogon refractus</i>, <i>Eragrostis elongate</i>, <i>Microlaena stipoides</i> & <i>Sporobolus creber</i>
Area of Vegetation Zone (ha)	0.39ha
Plot(s)	1 (VIS 5.5)
 Plate 12 - PCT 3433 Severely Degraded Condition BAM Plot 2 (start)  Plate 13 - PCT 3433 Severely Degraded Condition BAM Plot 2 (end)	

Appendix H: Site Photographs



Above: View of Riparian Vegetation within Subject Site
Below: Site predominated by cleared paddock areas





Above: Agricultural land use, cattle presence on Subject Site
Below: Northern Riparian vegetation of Subject Sit





Above: Stick pile by Riparian Corridor

Below: Grey Crowned Babbblers in landscape gardens in adjoining school.



Appendix I: Credit reports



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00048510/BAAS19076/24/00048647	4951 Lochinvar SBDAR	28/10/2024
Assessor Name	Assessor Number	BAM Data version *
Natalie S Black	BAAS19076	Current classification (live - default) (80)
Proponent Names	Report Created	BAM Case Status
Ray Bowen	17/02/2025	Finalised
Assessment Revision	BOS entry trigger	Assessment Type
1	BOS Threshold: Area clearing threshold	Part 4 Developments (Small Area)
Date Finalised	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
17/02/2025		

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

Assessment Id	Proposal Name
00048510/BAAS19076/24/00048647	4951 Lochinvar SBDAR



BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Not a TEC	0.4	0	0	0
4023-Coastal Valleys Riparian Forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.1	2	0	2

3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
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Assessment Id

00048510/BAAS19076/24/00048647

Proposal Name

4951 Lochinvar SBDAR

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BAM Biodiversity Credit Report (Like for like)

	Hunter-Macleay Dry Sclerophyll Forests This includes PCT's: 1608, 3431, 3433, 3436, 3437, 3439, 3442, 3444, 3446	Hunter-Macleay Dry Sclerophyll Forests >=50% and <70%	3433_Servely_D egraded	No	0	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
4023-Coastal Valleys Riparian Forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 1731, 3962, 3963, 3985, 3987, 3993, 4016, 4023, 4026, 4027, 4028, 4030, 4035, 4038, 4040, 4048, 4049, 4050, 4056	-	4023_Poor	Yes	2	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



BAM Biodiversity Credit Report (Like for like)

4023-Coastal Valleys Riparian
Forest

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00048510/BAAS19076/24/00048647	4951 Lochinvar SBDAR	28/10/2024
Assessor Name	Assessor Number	BAM Data version *
Natalie S Black	BAAS19076	Current classification (live - default) (80)
Proponent Name(s)	Report Created	BAM Case Status
Ray Bowen	17/02/2025	Finalised
Assessment Revision	BOS entry trigger	Assessment Type
1	BOS Threshold: Area clearing threshold	Part 4 Developments (Small Area)
Date Finalised	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
17/02/2025		

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

Additional Information for Approval

PCT Outside Ibra Added
None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Not a TEC	0.4	0	0	0.00
4023-Coastal Valleys Riparian Forest	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.1	2	0	2.00

3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Hunter-Macleay Dry Sclerophyll Forests This includes PCT's: 1608, 3431, 3433, 3436, 3437, 3439, 3442, 3444, 3446	Hunter-Macleay Dry Sclerophyll Forests >=50% and <70%	3433_Serve ly_Degraded	No	0	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
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BAM Biodiversity Credit Report (Variations)

	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	3433_Serve ly_Degraded	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
4023-Coastal Valleys Riparian Forest	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 1731, 3962, 3963, 3985, 3987, 3993, 4016, 4023, 4026, 4027, 4028, 4030, 4035, 4038, 4040, 4048, 4049, 4050, 4056	-	4023_Poor	Yes	2	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Forested Wetlands	Tier 3 or higher threat status	4023_Poor	Yes (including artificial)	2	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like options

Appendix J: CVs

Jarrod Baxter

Ecologist

Profile Summary

Jarrod works with AEP in the role of `Ecologist. He graduated with a Bachelor of Science (Marine Systems). Jarrod has previously worked in football administration before coming to AEP. Jarrod has experience in a variety of aquatic and marine work, both paid and unpaid. Jarrod's special interest areas and expertise include the identification of aquatic flora and fauna species observed during Riparian Assessments and Aquatic Surveys.

Academic Qualifications

- Bachelor of Science (Marine Systems & Management) – Southern Cross University, 2023
- Higher School Certificate – Northholm, Grammar School, 2020

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)
- Currently undertaking PADI Open Water dive course, Coffs Harbour

Professional Experience

Ecologist Anderson Environment & Planning Newcastle NSW	2024 – Present
Referee Administration Assistant Norther NSW Football Speers Point NSW	2023 - 2023
Football Referee Northern NSW Football Speers Point NSW	2023 - Present
Events & Admin Coordinator Northern NSW Football Speers Point NSW	2023 - Present
Work Placement Intern Marine Discoveries Cains QLD	2022 - 2022
Ocean Youth Ambassador Sea Life Sydney NSW	2019



Relevant Project Experience

Ecological Surveys

- Targeted Nocturnal Surveys searching for Squirrel Glider in Wyee (2024)
- Spot Analysis Techniques surveys in Austral (2024)

Ecological Assessment

- Riparian Assessments across NSW (2024)
- Aquatic Assessments searching for Key Fish Habitat and Purple Spotted Gudgeon in Stubbo and Lochinvar (2024)

Ecological Monitoring

- VMP Monitoring in the Northern Beaches (2024)

NATALIE BLACK

Senior Ecologist

Profile Summary

Natalie works with AEP in the role of Senior Environmental Manager. She has extensive knowledge in environmental management, environmental planning, fisheries, aquatic and riparian environments, and report writing and assessment. With a detail understanding of planning, catchment management, coastal management and rehabilitation. Natalie has had a successful career with both state and local government in conservation, planning and field investigation roles. Natalie has also gained extensive communication skills and project management through her previous career in lecturing in a range of course with a focus on environmental management and environmental legislation. Her background and experience in the ecological and planning fields is utilised in a diverse array of application in her current role.

Natalie Black is a conservation detection dog handler and is currently working with his purpose breed working English Springer Spaniel "Gus" who is currently trained to detect Koala scat, Forest Owl pellets and Cane Toads.

Academic Qualifications

- B.Sc (Hons) Sustainable Resource Management and Marine Science – University of Newcastle, 2001
- Master Planning – University of Technology Sydney, 2007
- Certificate IV Training and Assessment – TAFE, 2012
- BAM Assessor; accreditation number: BAAS19076

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- Provide First Aid HLTAID011
- Evidence Gathering and Legal Process, Australian Institute of Environmental Health
- Conflict Resolution Course (LGSA)
- Report Writing Course (LGSA).
- Powerful Presentation (LGSA)
- NSW Rural Fire Services Bush Fire Assessment
- Relocation of Threatened Species, Botanical Gardens Sydney
- Sustainable Home Assessment Reduction Revolution
- Flora and Fauna Survey Assessments Niche Environment and Heritage

Professional Experience

Senior Environmental Manager / 2019 – Present

Works Coordinator

Anderson Environment & Planning

Newcastle NSW

Principal Environmental Planner 2010 - 2019

Black Earth

Newcastle NSW

Senior Lecture 2010 - 2019

Hunter TAFE

Newcastle | Sydney

10 Darvall St Carrington 2294 | 275 Stanmore Rd Petersham 2049
P 0420 624 707 E info@andersonep.com.au ABN 57 659 651 537

Range of Hunter Campuses

Natural Resource Manager and Development Assessment Officer 2003 - 2010

Lismore City Council

Lismore NSW

Fish Passage Expert 2002 - 2003

NSW Department of Primary Industries

Ballina NSW

Conservation Officer 2000 - 2002

NSW Department of Primary Industries

Crows Nest, NSW

Volunteer NSW Fisheries 1998 - 2000

Varied Roles

Port Stephens, NSW

Relevant Project Experience

Ecological Survey examples

- Target surveys for *Thelymitra adorata* Halloran; Wyee, Wadalba;
- Target surveys for *Melaleuca biconvexa* Mardi, Halloran; Wyee, Wadalba
- Target surveys for *Tetratheca juncea* Hillsborough, Mardi, Thornton, Warners Bay;
- Target surveys for *Rhodamnia rubescens* Hillsborough, Mardi, Thornton, Stuarts Point, South West Rocks,
- Target Surveys for Cumberplain Snail and Dural Snail, Rouse Hill
- Target Search for seagrass and threatened marine fauna, Stuarts Point, South West Rocks, Lake Macquarie, Peat Island,
- Powerful Owl nest locating and monitoring: Salamander Bay
- Spot Analysis Techniques surveys: Lismore, Wallsend, Salamander Bay, North Arm Cove, Warnervale, Hamlyn Terrace, Wyee, Charlestown, Chisholm, Gillieston Heights, Mount Vincent, Hillsborough;
- Surveys for Squirrel Glider (*Petaurus norfolcensis*) Wadalba, Rouse Hill, Claremount Meadows, Wyee, Hillsborough, South West Rocks, Stuart Point;
- Frog Surveys: Lismore, Wallsend, Salamander Bay, North Arm Cove, Warnervale, Hamlyn Terrace, Wyee, Charlestown, Chisholm, Hillsborough Rouse Hill, Kariong, Wadalba,

Ecological Assessment examples

I have prepared over 125 Biodiversity Development Assessment Reports all in varying states of assessment, from on-going assessment through to approved. Examples of approved Biodiversity Development Assessment Reports:

- Teraglin Village, Chain Valley Bay;
- Railway Road, Warnervale;
- McFarlane's Road, Chisholm;

- Fairlands Road, Medowie;
- Raymond Terrace Road Chisholm,
- Annangrove Road, Rouse Hill
- Richmond Road, Marsden Park,
- Claremount Meadows,
- Newcastle Golf Course, Fern Bay,
- Newell Highway, Gilgandra
- Narromine Road, Dubbo
- Ecological Assessment Report for Proposed Modification to Approved Western Rail Coal Unloader at Pipers Flat;
- Infrastructure Ecology Reports;
 - Wyee Water Main;
 - Mardi Water Main;
 - Wyee Rising Main;
 - Mardi Rising Main;
- Summerhill Waste Facility Recycling Plant

Ecological Offsets and Monitoring

- Biodiversity Stewardship Agreements including:
 - Hillsborough
 - Blueys Beach,
 - Allandale,
 - South-West Rocks.
- Biodiversity Management Plans / Vegetation Management Plan / Wildlife Management Strategies
 - VMP for Proposed Modification to Approved Western Rail Coal Unloader At Pipers Flat;
 - VMP / WMS / Dewatering Plan for Wyee for 23ha Offset lands
 - VMP Rouse Hill Commercial Development.
 - BMP – Claremount Meadows Commercial Development.

Planning – Approved Review of Environmental Factors

- South West Rocks Installation of Seawall,
- Lake Macquarie upgrade of carpark, boat ramp and jetty,
- Demolition of two (2) jetties Peat Island,
- Stuart Point upgrades to caravan park including boat ramp.
- Wyee Rising Main
- Anambah Recycling Facility

Bushfire Threat Assessments

- Kempsey Correctional Facility for upgrade
- Stuarts Point Caravan Park for upgrades
- Claremount Meadows for a Commercial development included Daycare, and service station
- Batlow for a Service Station
- Lovedale for a change of use to Brewery

- Newcastle Golf Course Seniors Living
- Lovedale Eco Tourism

Aquatic / Marine Assessment

Honours project was sponsored by Wyong Shire Council and Stormwater Trust to determine the reason for significant levels of seagrass rack and odours in Tuggerah Lake. Honours project was undertaken while working for NSW Fisheries as Conservation Officer where I was required to undertake assessments of jetties, boat ramps, seawalls, boat sheds, dredging, reclamation and blockages to fish passage on marine, estuarine and freshwater systems.

During my final 18 months at NSW Fisheries, I was the Fish Passage Expert in Northern Catchment, Port Macquarie to Tweed Head including all western catchments draining to east coast. This role required identification of Fish Passage blockages and determine which structures can be retrofitted or replaced to allow fish to move freely through the catchment from sea to upper tributaries. This project had Commonwealth Funding of one million dollars. To apply the funding the I undertook the following assessment, where access was granted by land owners:

- Stream order;
- Stream geomorphology features (meanders, pools riffles, aquatic vegetation);
- Bank and bed structure and condition;
- Location and type of blockage;
- Surrounding terrestrial plant communities;
- Modifications; and
- Potential risk for opening passage such as bed erosion, release of contamination etc.

The information from the above resulting 26 structures being removed/replaced with Fish Friendly structures including opening up 19km of the Brunswick River and contributed to the development of fish friendly structures and providing data and evidence for the production of How do Fish Cross a Road.

The above skills allowed for me to teach the following aquatic units at Hunter Tafe at varying levels, Certificate iv, Diploma and Advance Diploma from 2010 until 2019:

- Catchment Management;
- Coastal Processes;
- Freshwater and Marine Ecosystems;
- Environmental Legislation; and
- Freshwater, Estuarine and Marine assessment and management.

My role at AEP includes the Lead Aquatic Ecologist, training, assessing, preparing and reviewing the following aquatic assessments:

- Riparian Assessment Reports (for controlled Activity Approvals);
- Aquatic Ecology Assessments (for all environments that trigger Section 7 of the FM, Act);
- Biodiversity Management Plan for Riparian, estuarine and marine environments; and
- Preparation of Permit and Approvals under FM Act and WM Act.

THOMAS STEPHENS

Project Manager

Profile Summary

Thomas works with AEP in the role of Ecologist / Project Manager. Thomas has industry experience in environmental fields, involving fauna and flora surveying, consultancy projects and natural resource management. With a grasp of environmental legislation and approval processes, he possesses expertise in implementing the Biodiversity Assessment Method.

Academic Qualifications

- Bachelor of Environmental Science and Management (Sustainability) – University of Newcastle, 2021
- Diploma of Arboriculture (AQF5), 2024

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- Provide First Aid HLTAID011
- NSW Construction White Card
- Work Safely at Heights
- Tree Access Systems Level 1

Professional Experience

Ecologist / Project Manager Anderson Environment & Planning Newcastle, NSW	2024 - Present
Ecologist / Project Lead Anderson Environment & Planning Newcastle, NSW	2023 - 2024
Ecologist Anderson Environment & Planning Newcastle NSW	2022 – 2023
Ecologist Active Green Services NSW	2022 - 2022
Ecologist and Bushfire Consultant Firebird EcoSultants Newcastle NSW	2021 – 2022



Relevant Project Experience

Ecological Surveys

- Surveys for Brushed-tailed Rock Wallaby (*Petrogale penicillata*), Oven Mountain.
- Arboreal Mammal Surveys, Oven Mountain and Upper Rouchel.
- Botanical Surveys including BAM plots, Denman, Belmont, Raymond Terrace. Camera trapping surveys for ground and arboreal species including deployment, collection, servicing and analysis. (Various Sites, August 2021 to Present).
- Diurnal bird surveys (Various Sites, August 2021 to Present).
- Frog surveys for threatened species (Various Sites, August 2021 to Present)
- Habitat surveys including tree hollow identification. (Various Sites, August 2021 to Present).
- Installation of nest boxes via rope and ladder access systems (Various Sites, August 2021 to Present).
- Songmeter survey for frogs, forest owls and birds including deployment, collection, servicing and analysis (Various Sites, August 2021 to Present).
- Threatened orchid and ground cover surveys via 5m transects. (Various Sites, August 2021 to Present).
- Threatened shrub surveys via 10m transects. (Various Sites August 2021 to Present).
- Threatened Tree surveys via 40m transects. (Various Sites August 2021 to Present).
- Threatened Flora surveys via 5m transects. (Various Sites August 2021 to Present).

Ecological Assessment

Certifier for Ecological Assessments:

- Belmont Wetlands State Park;
- Central Coast Wetlands;
- Cameron Park Drive, Cameron Park

Assisting the Assessor for approved Biodiversity Development Assessment Reports:

- Waterford, Chisolm;
- Narromine Road, Dubbo;
- Mungo Brush Road, Hawks Nest.

Ecological Monitoring

Assisting in Biodiversity Stewardships Agreements including:

- Hillsborough;
- Blueys Beach.

Arboricultural Assessment

Assisting AQF Arborist for Arboricultural Impact Assessments:

- M1 Motorway, Wyong;
- Freemans Drive, Cooranbong;
- Railway Road, Warnervale;
- Warnervale Road, Warnervale;
- Old Maitland Road, Mardi;
- New England Highway, Windella;
- Alliance Avenue, Morisset.

BRENDON YOUNG

Project Manager

Profile Summary

Brendon works with AEP in the role of Project Manager and Ecologist/Aquatic Ecologist. He graduated with a Bachelor of Applied Science (Fisheries w/Honours), a Masters in Environmental Management and Graduate Certificate in Fish Conservation and Management. Brendon has previously worked in large retail operations in staff and budget/data management, reporting and quality assurance which adds to the experience that he currently contributes to the AEP team.

Academic Qualifications

Charles Sturt University

- Master of Environmental Management (Water Resources) 2022
- Graduate Certificate of Fish Conservation and Management

University of Tasmania

- Bachelor of Applied Science (Fisheries) with Honours

Training, Licences and Professional Memberships

- NSW Class C Driver's Licence
- WHS NSW Construction Induction White Card
- First Aid (Provide First Aid HLTAID011)

Professional Experience

Project Manager/Aquatic Ecologist Anderson Environment & Planning Newcastle NSW	Jan 2024 – Present
Project Lead/Ecologist Anderson Environment & Planning Newcastle NSW	Oct 2023 – Jan 2024
Ecologist Anderson Environment & Planning Newcastle NSW	Sept 2022 – Oct 2023
Department Manager Woolworths Pty Ltd	2013 - 2022
Produce Quality Control Officer Woolworths Pty Ltd	Mar 2019 - Oct 2019

Relevant Project Experience

Ecological Surveys

- Watercourse Assessment with the NRAR Waterfront Land Tool in Hunter Valley, Central Coast, Midcoast and Dubbo regions.
- Key Fish Habitat surveys at Karuah River Port Stephens, Hunter River Lochinvar and Chisholm, Manning River Tibbuc and Lachlan River Stubbo.
- Dip netting for *Mogurnda adspersa* in Lochinvar, Tibbuc, Chisholm and Stubbo.

- Seagrass and Mangrove surveys in Port Stephens.
- Targeted, systematic transects for threatened flora species.
- Deployment of Camera Traps, Songmeter and Anabats across central Coast and Hunter Valley regions for targeted survey.
- Spot Assessment Technique surveys: Halloran, Windella, Ourimbah, Chisholm.
- Weed mapping: Taree, Ourimbah, Hunter Valley.

University

- Training with aquatic sampling techniques such as seine nets, gill nets and fyke nets.
- Training in the use of mist netting, bat harp traps, Elliot traps, pitfall traps and camera traps.
- Identification of fish, reptiles, insects, and plants to species level through honours research and other projects while studying.

Ecological Assessment

- Riparian and watercourse assessment with the Waterfront Land Tool in the Hunter Valley, Central Coast, Sydney and Hastings regions.
- Preparation of Vegetation Management Plans in the Hunter Valley, Central Coast and Midcoast regions.
- Bushfire Threat Assessment in accordance with PBP 2019 at various sites across the Hunter Valley and Central Coast regions.
- Assist with Arborists assessments in Central Coast, Sydney, Mudgee and Hunter Valley Regions.

Ecological Monitoring

- Primary contributing author for Garden Suburbs Biodiversity Stewardship Site Assessment Report and associated Management Plan.

Publications

- Courtney, A.J., Schemel B.L., Wallace, R., Campbell, M.J., Mayer, D.G. and Young, B. (2005) *Reducing the impact of Queensland's trawl fisheries on protected sea snakes*. FRDC Project No. 2005/053. Queensland Government.

YANN BUISSIÈRE

Senior Ecologist

Profile Summary

Yann works with AEP in the role of Senior Ecologist - Lead Botanist. Yann has over 15 years of professional experience managing projects in the field of ecology, natural area restoration, biodiversity conservation, community education, flora and fauna pest management and the development of environmental management systems. Yann has experience in both private and public sector engaging with a diversity of stakeholders on various projects to achieve positive environmental outcomes.

Yann leads the Biodiversity Stewardship Agreement and Vegetation Management Plan division of the business to assist landholders in managing their land for biodiversity conservation. He also mentors and train junior staff in the application of the Biodiversity Assessment Method, vegetation mapping and plant identification.

Academic Qualifications

- Bachelor of Resources and Environmental Management, Macquarie University (2008)
- Diploma of Conservation and Land Management, TAFE (2013)

Training, Licences and Professional Memberships

- BAM Accredited Assessor Training (in completion)
- Commercial Drone Accreditation
- Advanced Plant Identification (University of New South Wales)
- NSW Class C Driver's Licence.
- Operate and Maintain a Four-Wheel Drive Vehicle and undertake Winch Recovery
- Work Health & Safety White Card
- First Aid Certificate
- Vertebrate Pest Control
- Chainsaw Operation and Maintenance
- Local Control Authority Officer – Biosecurity Act 2015
- Working Safely at Heights



Professional Experience

Senior Ecologist - Lead Botanist Anderson Environment & Planning Newcastle NSW	2023 – Present
Biodiversity and Resilience Officer Maitland City Council Hunter Valley NSW	2021 - 2023
Ecologist (Botanist) Anderson Environment & Planning Newcastle NSW	2019 - 2020
Ecologist (botanist) Kleinfelder Newcastle NSW	2018 - 2019
Bushland Team Coordinator Northern Beaches Council (formerly Manly Council) Sydney NSW	2015 - 2018
Project Manager/Team Leader Australian Bushland Restoration Sydney NSW	2010 - 2015
Bushcare Supervisor Mosman Council Sydney NSW	2010 - 2013
Bush regenerator Australian Bushland Restoration Sydney NSW	2008 - 2010

Relevant Project Experience

Ecological Survey examples

Vegetation Mapping / BAM

- Vegetation mapping, Plant Community Type determination and Threatened Ecological Community assessment for Blueys Beach BSA, Bulahdelah Solar Farm and Hunter Gas Pipeline (Hunter, Liverpool Plains), Belmont Desalination Plant, Vintage estate (Pokolbin), Mount Malumla
- Over 500 BAM plots throughout Sydney Basin, Hunter region, Liverpool Plains and Mid-north Coast on a diversity of projects

Threatened species surveys

- Targeted surveys for a several threatened flora species incl *Grevillea parviflora*, *Callistemon linearifolius*, *Rhodamnia rubescens*, *Corybas dowlingii*, *Tetratheca juncea* (Eden Estate - West Wallsend)
- Targeted survey for *Thelymitra adorata*, Halloran
- Targeted surveys for a several threatened flora species including *Dicanthium setosum*, *Rutidosis heterogama*, *Eucalyptus glaucina* (Hunter Gas Pipeline - Liverpool Plains)
- Targeted surveys for *Eucalyptus glaucina* at Pokolbin
- Targeted surveys for *Hibbertia procumbens* at Somersby
- Koala Spot Assessment Technique (SAT) at Halloran, Vintage Eastate (Pokolbin), Eden Estate (West Wallsend)
- Targeted survey for Green and Golden Bell Frog, Green-thighed Frog and Wallum Froglet (various sites)
- Targeted surveys for Striped legless lizard (Hunter Region)

Ecological Monitoring

- Karuah Quarry ecological monitoring including threatened species health (*Tetratheca juncea* and *Asperula asthenes*)
- Mine rehabilitation/offset monitoring for Duralie and Stratford (Gloucester)
- West Wallsend Colliery ecological health monitoring
- Greening Plan revegetation Sites Monitoring (Maitland)
- Various VMP/BMP monitoring in Maitland, Port Stephens, Lake Macquarie, Central Coast